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United States
Department of
Agriculture

Economic
Research
Service

RS-88-4
June 1988

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China

Agriculture and Trade Report

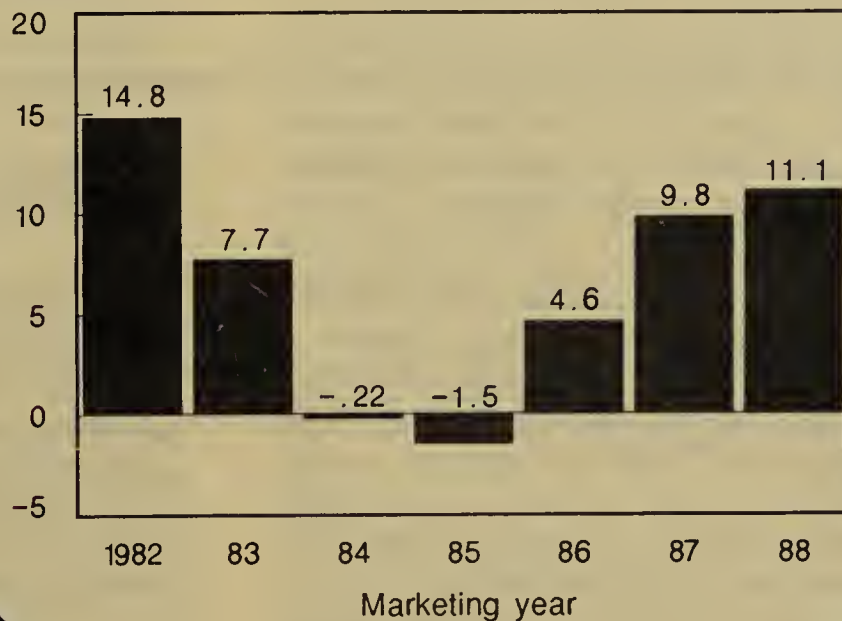
Situation and Outlook Series

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JUL 20 1988

China's Net Grain Imports

Million tons



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Approved by the World Agricultural Outlook
Board. Summary released June 27.

China Agriculture and Trade Report is one of
four regional situation and outlook reports
published annually by the Economic Research
Service. Other titles in the series are Western
Europe, USSR, and Pacific Rim.

Annual subscriptions and single copies are
available from the Superintendent of
Documents, U.S. Government Printing Office
(GPO), Washington, D.C. 20402. For ordering

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SUMMARY

U.S. agricultural exports to China in fiscal 1988 could exceed \$400 million, well above the \$211 million of fiscal 1987. During 1987, USDA initiated four EEP sales of 1 million tons each. Two additional EEP wheat initiatives were made in early 1988.

By the year 2000, China's grain output may approach 500 million tons, up from the 1983-87 average of 394 million. Area sown to grain probably will decrease over the next 12 years, but improved yields could boost total output. However, per capita consumption probably will rise slowly, as gains in output may be offset by increases in population and feed use. Efficient coarse grain producers in the northeast and rice producers in south China likely will export small quantities of grain in the year 2000, but China is expected to remain a net grain importer. Coastal urban areas will import sizable quantities of wheat for human consumption and limited quantities of feed grains.

Livestock numbers rose at a faster pace than grain and oilseed production during the past 3 years, and feed shortages began to appear in 1986 and 1987. The shortages stopped livestock product expansion in 1987. This year, feed shortages are expected to hold pork production at 1987 levels, although production of ruminant animals and poultry will probably rise. With grain and oilseed production expected to expand to the year 2000, the nutritional requirements of China's consumers will continue to be met primarily by grains, oilseeds, vegetables, and fruits. Per capita consumption of livestock products will expand, but only at modest rates. The average consumer is not expected to eat substantial amounts of meat by the year 2000.

China's farmers are expected to reduce grain area this year by half a million hectares from 1987. However, yields are projected to increase nearly 2 percent so that total grain output, including grains, soybeans, potatoes, and pulses, is likely to exceed 1987's 402 million tons. The 1987 harvest was up about 10 million tons from 1986.

Wheat production is forecast to slightly exceed last year's output. In 1987, production fell more than 2 million tons from a year earlier to 88.7 million, primarily because of reduced area.

China's authorities expect the 1988 rice crop to reach the 1984 record of 178 million tons, as area sown to hybrid varieties likely will expand 1 million hectares and fertilizers will boost yields. The 1987 rice crop was up from a year earlier to 174 million tons.

Production of coarse grains—corn, sorghum, millet, barley, oats—is projected to decline more than 2 million tons from the 1987 record of 95.8 million. Reduced sown area will account for most of the decrease.

Following a downturn in grain production in 1985, China's grain imports began rising in 1986, when demand exceeded supplies and stocks fell. Feed shortages appeared, grain exports slowed, and wheat imports rose dramatically. About 95 percent of total grain available for consumption is produced domestically and the remainder imported. Around 25 percent of total use is fed to livestock, 4 percent is used for seed, and 71 percent is used for food. At present, ending stocks are estimated to be about 19 percent of total supply.

Cotton and oilseed output expanded in 1987 after 2 successive years of decreases. Cotton production advanced 18 percent from 1986 to over 4 million tons, because of increased sown area and yields. Oilseed production rose primarily because of larger output of rapeseed and cottonseed. Peanut and soybean output rose marginally while sunflowerseed declined.

Pork production decreased last year for the first time since the late 1970's, but red meat production rose with increased beef and mutton output. The number of dairy cows expanded to 2 million and milk output increased 10 percent. Egg and poultry meat output also rose in 1987.

MACROECONOMY

Steady Economic Growth in 1987

China's gross national product (GNP) increased in 1987 to 1,092 billion yuan, 9.4 percent above 1986. National income rose 9.3 percent to 915.3 billion yuan, topping 1986's 7.8-percent increase but below the 12 percent recorded in 1984 and 1985. Gross industrial output advanced 16.5 percent over 1986. Light industrial output rose 16.8 percent, while heavy industrial production increased 16 percent. In 1987, over 14 percent of industrial output was generated in rural enterprises above the village level.

The energy sector increased output, with coal reaching 920 million tons, up 2.9 percent from 1986, and crude oil production at 134 million tons, up 2.6 percent. Electric power expanded 10.3 percent; about 20 percent of output comes from hydroelectric sources. Despite these gains, energy continued to be in short supply in rural areas.

The output of rural society, including agricultural and nonagricultural production, was worth 904.1 billion yuan, up 12.7 percent from 1986. For the first time, the value from nonagricultural enterprises exceeded that from agriculture. Output from rural industry, construction, transportation, and commerce reached 459.4 billion yuan, up 21.8 percent. Agricultural output reached 444.7 billion yuan, up 4.7 percent from 1986. The 1987 gross value of agricultural output by subsectors has not been published, but data for other recent years suggest that the fastest growing components are the livestock, aquatic products, and sideline (village handicrafts) subsectors (see table 1).

Table 1--Index of China's agricultural output

	1982	1983	1984	1985	1986
1978=100					
Total	133.6	146.4	172.1	196.6	217.8
Crops	124.5	134.8	148.2	145.3	146.6
Livestock	147.0	152.8	173.2	203.0	214.2
Forestry	128.5	141.7	168.6	176.8	170.0
Fisheries	121.9	132.3	155.6	185.1	223.2
Sidelines	152.7	170.4	226.7	273.4	328.0

1/ Calculated from State Statistical Bureau data on gross value of agricultural output excluding village industry, in constant prices.

Prices rose 7.3 percent from 1986. In urban areas and towns, commodity prices increased 9.1 percent, while those in the countryside climbed 6.3 percent. Food prices rose 10.1 percent, with aquatic foods up 17 percent, vegetables up 17.7 percent, and meats up 16.5 percent. Clothing costs were up 3.5 percent and fuels climbed 3.6 percent. The cost of agricultural inputs increased 7 percent. While procurement prices for some grains increased slightly, prices for agricultural and sideline products (handicrafts and services such as barbering and transportation) advanced 12 percent from 1986.

The income of urban and rural workers continued to increase in 1987. Household survey data showed that per capita income for urban residents rose 2 percent to 916 yuan, but the increase is less if the rise in prices is considered. Per capita net income for rural families increased 9.2 percent, but that drops to 5.3 percent when price increases are factored in.

Population grew by about 15 million people in 1987 to 1.080 billion. The natural increase rate rose to 14.39 per 1000 from 14.08 in 1986.

Foreign Trade Deficit Shrinks

Foreign trade expanded steadily in 1987 to \$83.8 billion, 12 percent above the previous year. Imports held steady at \$43.9 billion, only 1 percent over 1986. Exports expanded 27.3 percent to \$39.9 billion. This left China with a trade deficit of only \$3.9 billion, compared with \$15.3 billion and \$12.1 billion in 1985 and 1986, respectively.

Exports of manufactured goods increased, while the proportion of primary goods decreased. Textiles led exported commodities, accounting for about 25 percent of the total. Exports of machinery, electronic items, and consumer goods increased.

Technology, equipment, and raw material imports vital to the development of the country increased. Imports of quality consumer goods, such as household electrical appliances and motor vehicles, were restricted again.

China's foreign exchange was \$15.2 billion, up 44 percent from 1986 as a result of

expanded trade volume and foreign investment. Overseas projects and labor services earned \$1.74 billion in 1987, a 28-percent increase from 1986. China's special economic zones of Shenzhen, Zhuhai, Shantou, and Xiamen earned export incomes of \$2.7 billion, an increase of 114 percent over 1986. Moreover, 26 million tourists visited China in 1987, a 17.9-percent increase, and the country earned \$1.84 billion from these visitors, 20.3 percent above 1986.

U.S.-China bilateral trade expanded 33.7 percent to \$10.4 billion in 1987. U.S. exports were \$3.49 billion, up 13.3 percent, but imports from China were \$6.91 billion, up 370 percent. For the fourth year in a row, U.S. imports from China exceeded exports, and in 1987 the deficit reached \$3.42 billion.

China's foreign trade organizations are being changed. Provinces and municipalities now draw up economic development plans, which include foreign trade plans. A responsibility system will be implemented so that local organizations can retain a portion of earnings after they give the state the prescribed quota. The Ministry of Foreign Economic Relations and Trade (MOFERT) will continue to export and import certain key commodities. Other goods will be in MOFERT's plan, but the trade will actually be conducted by local foreign trade companies. Most goods, however, will fall into the third category and will be moved by local companies. MOFERT will continue to coordinate trade and will control import and export licenses.

China continues to expand its foreign economic involvement. It joined the World Bank in 1980 and the Asian Development Bank in 1986, and has applied for membership in the GATT. It has cooperative ties with the United Nations Food and Agricultural Organization, the World Food Program, World Food Council, and the International Fund for Agricultural Development Program. Also, China has entered into agrotechnical bilateral cooperative agreements with more than 90 countries.

This year is the middle of the Seventh Five-Year Plan (1986-1990) and the primary task is to stabilize the economy and further the reform. Efforts will be made to expand total output, and China's planners expect GNP

to increase by 7.5 percent. Agricultural production should rise by 4 percent and industrial output by 8 percent. Planners will try to restrain investment and limit the growth of consumer demand. Incomes are expected to rise, but as cities and provinces implement reforms the increase in prices may outpace rises in incomes. Foreign trade should expand, with exports continuing to increase but less than the 25-percent rise in 1987. A greater portion of the exports will be finished products, while shipments of primary products like crude oil, grain, vegetable oil, and meat will decrease. Imports are expected to increase because of greater foreign exchange holdings and the need for key items of equipment. However, imports of luxury consumer goods likely will not expand. [Frederick W. Crook (202) 786-1626]

AGRICULTURAL TRADE

The agricultural trade surplus decreased in 1987 and China became a net importer for the first time since 1982. Exports of farm products decreased by 16 percent compared with imports which increased 93 percent. Imports from the United States increased from \$57 million in 1986 to \$363 million in 1987. In 1987 the United States changed from being a net importer of farm goods from China to a net exporter.

Decrease in Agricultural Trade Surplus

China's \$3.3 billion agricultural trade surplus in 1986 shifted to a \$163 million deficit in 1987. Changes in grain trade accounted for most of the change (table 2).

Grain imports shifted from 7.3 million tons in calendar 1986 to 16.2 million tons in 1987. Grain exports decreased from 9.4 million tons in 1986 to 7.1 million tons in 1987. Sugar and edible vegetable oil imports also increased sharply in 1987. The value of canned food exports expanded 29 percent to 2.0 billion yuan in 1987. The value of raw cotton exports expanded by 57 percent to 2.8 billion yuan (tables 15 and 16).

In 1988 China likely will have a balance in the value of its agricultural imports and exports. Grain imports will not increase much and great efforts will be made to expand exports. Rice exports will continue but raw

cotton exports could slow down a little compared with last year. Exports of fruits and canned goods are expected to increase in 1988.

Sharp Increase in U.S. Exports

U.S. agricultural exports to China increased over 500 percent in calendar 1987 to \$362 million, well above 1985 and 1986 but below the \$613 million in 1984 (table 17). The primary reason was expanded shipments of wheat, corn, and soybeans. While the USDA began the Export Enhancement Program (EEP) in May 1985, no wheat was sold to China under the program until February 1987. The United States offered 4 million tons in calendar 1987.

U.S. imports from China increased by 16 percent to \$237 million in 1987 (table 18). The U.S. agricultural trade balance with China shifted from a deficit of \$46 million in 1986 to a surplus of \$125 million in 1987.

In 1988, there should be continued improvement in U.S. agricultural exports to China. Some of the EEP wheat sold in November and December was delivered in 1988. For fiscal 1987/88, it is expected that the value of U.S. shipments probably will exceed \$400 million, well above the \$234 million of 1986/87. In January 1988, USDA initiated an offer to sell dairy cattle and firms in China have purchased 155 heifers and 30 bulls. [*Frederick W. Crook (202) 786-1626*]

<u>Offer date</u>	<u>Quantity</u>	<u>Purchase date</u>	<u>Delivery period</u>
Jan. 26, 1987	1 million tons	Feb. 11--Mar. 11	May --Oct.
Aug. 18, 1987	1 million tons	Aug. 27--Oct. 8	Oct.--Dec.
Nov. 17, 1987	1 million tons	Nov. 25--Dec. 21	Jan.--Mar.
Dec. 11, 1987	0.7 million tons	Dec. 12--Dec. 29	Mar.--Apr.
	0.3 million tons	Jan. 27	Mar.--May
Feb. 5, 1988	1.2 million tons	Feb. 12--Apr. 12	Mar.--Aug.
Apr. 5, 1988	2.0 million tons	Apr. 12--Apr. 26	Jul.--Sep.

Table 2--China's foreign trade indicators

	1985	1986	1987
Million dollars			
Exports			
Total	27,559	31,337	39,920
Agri.	5,472	6,099	5,121
Imports			
Total	42,832	43,403	43,860
Agri.	2,308	2,734	5,284
Balance			
Total	(15,273)	(12,066)	(3,940)
Agri.	3,164	3,365	(163)
Foreign exchange reserves	11,913	10,514	15,236
Yuan per dollar			
Exchange rate, average	2.9367	3.4528	3.7221

() Indicates negative number.

All trade data are on an f.o.b. calendar year basis.

Sources: General Administration of Customs, *China's Customs Statistics*, various issues; International Monetary Fund, *International Financial Statistics*, May, 1988, pp. 162-163.

AGRICULTURAL POLICIES AND PLANS

China's main policy themes last year were holding the line on increasing retail prices of farm products and maintaining the grain area. Retail prices for food grains were tightly controlled by the government, but livestock product prices were allowed to fluctuate, and pork prices skyrocketed because of strong demand. Increases in purchase prices of corn, rice, cotton, and peanuts raised output.

Total grain output increased in 1987 to 402.4 million tons, about 11 million tons over the previous year, but still roughly 5 million below the 1984 record. Three consecutive years of below-par grain production kept reform leaders searching for valid policies to revive output. Anti-reformers criticized reform leaders for failing to produce more grains, and causing feed grain shortages, lower stocks, and higher imports.

There is much debate within China about the underlying causes for the slowdown in grain production, and what policies might correct the problem. For better agricultural

production in 1988, the government raised some grain, oilseed, and cash crop purchasing prices; increased central and local government investment; encouraged use of inputs through the fertilizer and diesel oil bonus system; continued the land reclamation program to offset loss of farm land; and reformed the marketing system, including agricultural commodity trade.

With the slowdown in grain production since 1985, China's planners are convinced that grain output will grow slowly in the coming years. They believe that the 1990 target of 450 million tons will not be achieved until 1992. The 1988 plans call for a moderate increase of 4.7 percent in the value of agricultural production, similar to last year and significantly lower than increases of the early 1980's. Specific 1988 goals include a grain output of 410 million tons and a cotton crop of 4.5 million tons. Economic planners also call for increases in oilseed, sugar, and other cash crops. The quantity of grain that the state intends to purchase from farmers in 1988 remains unchanged from 1987, but the price has been increased slightly. State grain purchases now constitute about 20 percent of total grain output. The changes, including oilseeds and sugar crops, are as follows:

- o Wheat procurement prices rose 0.03 yuan per kilogram in most areas, but increased 0.04 yuan in Guangdong, Guangxi, Fujian, Yunnan, and Guizhou. In general, the price change amounts to about a 7-percent increase. For example, Henan province, China's major wheat producer, has announced that the price would go from 0.45 yuan per kilogram to 0.48 yuan. The five provinces which will get the larger increase are not major wheat-growing areas.
- o The procurement price of Japonica rice increased 0.04 yuan per kilogram in Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, and Heilongjiang. The change varies by location, but represents about a 10-percent increase over the previous year. These provinces or cities grow less than 5 percent of China's total rice. Price increases for Indica and Japonica rice in other parts of China took effect for the 1987 crop (see 1987 China: Situation and Outlook Report).

- o Corn procurement prices rose 0.03 yuan per kilogram in Jiangsu, Anhui, Hubei, and Sichuan, and 0.04 yuan in Guizhou, Yunnan, and Guangxi. The change represents a 9- to 12-percent increase depending upon province. China announced an increase in the corn price for 14 major growing provinces in 1987 (see 1987 report). These provinces grew about 22 percent of the 1986 crop.
- o Rapeseed and oil procurement prices are up from a ratio of 30 percent base price and 70 percent bonus price to 20 percent base and 80 percent bonus. The price for low-erucic-acid rapeseed will also be raised. In general, the shifted ratio implies an increase of 7.7 percent for both rapeseed and oil procurement prices over the previous year.
- o Sunflowerseed and oil procurement prices also increased from the ratio of 30 percent base and 70 percent bonus to 20 percent and 80 percent. The change represents about a 4-percent increase.
- o Seed and oil prices for sesame and teaseed have also been increased. Linseed prices shifted from 30/70 to 20/80 base and bonus.
- o Sugar crop procurement prices have been increased in 1988. For cane, an additional 8 yuan per ton will be paid to farmers, and for beets, 16 yuan per ton. Sporadic increases were granted by provinces in 1987, and the 1988 increase should raise farmers' sugarcane returns from about 0.07 yuan per kilogram to 0.078 yuan, and from 0.075 yuan per kilogram to 0.091 yuan for beets.

Cotton prices were not raised in 1988. The Ministry of Commerce confirmed that the grain bonus, in the form of 128 yuan cash per ton of cotton sold to the state, will only apply to cotton that is transferred from one province to another. The figure is the estimated difference between one metric ton of grain purchased on the free market and the state procurement price. The policy is aimed at moving more cotton out of Shandong, Hebei, Henan, and Xinjiang provinces.

Farmers' incentives have been increased by the higher procurement prices. The

government also reinforced the bonus system that allows farm households to buy more and better fertilizer and diesel oil at fixed prices. The bonus system remains in effect for grain and cotton delivered to the government. This includes 12 to 20 kilograms of fertilizer and 6 kilograms of diesel oil for every 100 kilograms of grain and cotton delivered to the state.

The government is scheduled to increase its agricultural investment by 15 percent, according to China's 1988 budget plans. China's investment in capital construction for agriculture was over 11 percent of total investment in 1979, but dropped to a low of 3.3 percent in 1986, and probably was only 3.5 percent in 1987. Because of the decreases in investment in recent years, water conservancy projects have not been maintained well, upgrading of farm machinery has been neglected for years, and agricultural technicians are in short supply. This year's increased investment should boost farm output.

China's government again emphasized land reclamation programs in 1988, particularly in the Northeast Region. Plans call for reclamation of more than 660,000 hectares of wasteland in Heilongjiang and improvement of some low-yield land by 1990. The goals are to produce an additional 5 million tons of grain and 800,000 tons of meat a year. Overall, the government has made additional adjustments in policy to achieve its 1988 production plans. The adjustments are expected to help China's grain production exceed 1987 output.

These policy adjustments were set to accomplish 1988 targets. Policies to deal with complex long-term problems in farming and grain supply will require more debate, experimentation, and research. Different views have been expressed regarding long-term policy changes. One view is that to maintain normal growth in agricultural production will require increasing investment, raising procurement prices, and reforming the marketing system over a long period. Other possibilities include reforming the price system and adopting land transfer rights to encourage farmers to invest in the land they cultivate. However, none of these dramatic policy changes have been adopted or used nationwide.

Recent price relaxation on agricultural commodities, such as grain, meat, eggs, and

sugar in Shanghai, Beijing, Tianjin, and, Guangzhou has been the extent of reform. China's leaders recognize that price reform is risky, but also a must. Success in this area may accelerate reforms in other areas. Official announcements on major reforms and policy changes may come late this year or in 1989. [Francis C. Tuan (202) 786-1626]

INPUTS

Capital Inputs Rose in 1987

The output value of farm machinery expanded 29 percent in 1987. The yearend inventory numbers for trucks, and large and small tractors increased (see table 3). In 1987, the area plowed and planted by machine totalled 40.5 million hectares and 13.2 million hectares, up 4 and 8 percent, respectively, over 1986 but still below the 1979 record of 42 million and 15.5 million. Farm households own 91 percent of small tractors and 64 percent of farm trucks. About 50,000 farm machinery service centers in rural areas provide sales, service, supplies, and training. The introduction of the household responsibility system in 1979-85, which often led to the formation of small plots from larger collectively cultivated fields, seems to have reduced use of cultivation machinery. New land use laws which permit plot consolidation may lead to greater use of machinery.

Rural consumption of electricity increased to 65.9 million kWh, 14 percent above 1986. Agriculture's share of total use has been declining. Rural enterprises used 18.7 percent of the available supply in 1980 and about one-third by 1985. Household use for domestic and lighting purposes has remained at just over 20 percent of the total. Over 35 percent of China's rural population is without electrical service. The Seventh Five-Year-Plan (1986-1990), intends to provide electricity to 33 million people in 100 rural counties. This would reduce those without electricity to 30 percent. The central government is planning to spend 100 million yuan per year on this project, about 17 percent of the investment cost. The remaining funds are to be raised in the rural counties to build small hydroelectric power stations.

Chemical fertilizer applied in 1987 rose 3 percent. Domestic production on a

gross-weight basis rose from 72 million tons in 1986 to 81 million in 1987, making China the world's third largest producer of chemical fertilizer. In 1987, farmers applied an average 200 kilos per hectare, a rate higher than that in the United States and USSR but lower than in France, Holland, and Japan. Soil scientists in China report a general decline in soil fertility because of more intensive land use and the area sown to green manure crops has declined. They also note that much improvement can be made in the scientific application of chemical fertilizers.

The chemical fertilizer output target for 1988 is 85 million tons, a 5-percent increase over 1987. Both central and local governments will invest funds to renovate and expand old plants. Plans are underway to extend transportation lines to the Dianchi phosphate deposit in Yunnan province to expand output of this much-needed fertilizer.

Rural Communication and Transportation Systems

Communication and transportation links are becoming more important in rural China as markets develop. From 1980 to 1985 (the period for which most recent data are available) rural post-telecommunication offices increased more than 5 percent from

42,772 to 45,017. However, by 1985 only 54 percent of the townships had these important communication centers. By 1985, postal routes had increased to 4.3 million kilometers and the number of mail boxes had expanded to 1.36 million. The number of telephone subscribers increased over 16 percent, from 799,000 in 1980 to 931,000 in 1985, and the number of telephone sets rose from 1.35 million to 1.5 million. In 1985, there was an average of one telephone set per 127 rural families.

Market information is also carried by radio, TV, and wired broadcast systems. In 1985, 54 percent of rural households had radios and about 12 percent had TV sets. A major communication link continues to be the rural wired (cable) broadcasting system. In 1985, there were 2,226 county-level broadcast stations, 50,614 amplifying stations at township levels, and 212,508 broadcast offices at the village level. However, the number of villages reached by the system decreased from 84 percent in 1980 to 70 percent in 1985.

In 1987, China's transportation system moved 2,190,000 million ton/kilometers of cargo, up 9.2 percent from 1986. Railroads carried 43 percent, waterways 43 percent, highways 11 percent, and pipelines 3 percent. In 1986, railroads transported 46.5 million tons

Table 3--China's major manufactured farm inputs

	Unit	1983	1984	1985	1986	1987
Yearend stocks						
Large-medium tractors	1,000 no.	841	854	864	871	880
Hand tractors	"	2,750	3,289	3,810	4,700	5,300
Rural trucks	1,000 no.	275	349	430	494	560
Power irrig. & drain. equip.	1,000 hp.	78,492	78,821	78,500	--	--
Machinery production						
Large-medium tractors	1,000 no.	37	40	45	34	40
Hand tractors	"	498	689	823	775	--
Internal combustion engines	1,000 hp.	28,990	4,702	--	--	--
Rural electric consumption 1/	Mil. kWh.	43,520	40,720	55,470	57,800	65,900
Fertilizer output 2/	1,000 tons	13,789	14,602	13,222	13,957	--
Nitrogen	"	11,094	12,210	11,438	11,592	--
Phosphate	"	2,666	2,360	1,760	2,340	--
Potassium	"	29	(32)	(24)	(25)	--
Fertilizer applied 2/	1,000 tons	16,598	17,731	17,760	19,520	20,100
Chemical pesticides	"	331	310	211	203	260

() Indicates derived.

1/ Not all for agricultural production. 2/ All figures in effective nutrient weight.

Sources: Various annual SSB Communiques; China Stat Yearbook, 1987, p. 287.

of grain (42,407 million ton/kilometers), a 3.3-percent increase over 1985. In the same year, railroads carted 2.2 million tons of cotton (2,893 million ton/kilometers), a 45-percent increase over 1985. Of the grain transported by railroad, the average distance was 912 kilometers. An average of 2,285 freight cars were loaded each day with an average weight of 55.3 tons.

Rural areas have 313,000 kilometers of roads, about one-third of the total. About two-thirds of rural roads are paved. In 1985, over 90 percent of the nation's townships were connected by roads. The central government plans to invest 1.48 billion yuan in highway construction in 1988, which is about 0.6 percent of annual government revenues. Local governments were scheduled to raise another 2 billion yuan. Also, the government plans to draw grain and cotton out of stocks as payment-in-kind to compensate rural workers for constructing local roads.

Investment in the Agricultural Sector

Assessing the volume of investment in China's agricultural sector is complicated because so many institutions, such as central and local governments, local economic cooperatives, banks, and farm households, are involved and because of lack of data (table 4). Central government revenues in 1987 were 234 billion yuan, up 8.6 billion from 1986. More than 90 percent of the revenues came from tax receipts. Expenditures totaled 242 billion yuan, leaving a deficit of 8 billion, 1 billion more than in 1986.

Preliminary data for 1987 budget expenditures suggest that about 25 percent was for capital construction, 17 percent for education, science, and health, and 9 percent for defense (see table 4). Expenditures to support agriculture totalled 13.42 billion yuan, up about 1 billion from 1986. Central government expenditures on agriculture were 7 percent of the budget in 1979, 5.3 percent in 1986, 5.5 percent in 1987.

Central government expenditures on capital construction decreased 10 percent during 1987. Nonetheless, some of the funds were used to assist agriculture, such as increasing chemical fertilizer plant capacity, rail and roads, and new electrical generating capacity. Central government expenditures on education, science, and health in 1987 increased 6.7 percent from 1986, which eventually will aid the agricultural sector.

There is little information on investments in agriculture by local governments. Townships are assumed to use some of their resources to build roads, and they organize the labor force to construct water control projects. Also, little is known of investment spending by economic cooperatives. The general impression is that most of their financial resources have been invested in rural industry.

Rural bank deposits and loans have increased sharply since reforms were initiated in the early 1980's, but shortages of capital funds remain a significant limiting factor in developing the economy. Of the total amount

Table 4--China's central government revenues and expenses for 1986

	Billion yuan	Percent of total		Billion yuan	Percent of total
I. Total revenues	226.03	100.00	II. Total expenditures	233.08	100.00
1. Various taxes	209.07	92.5	1. Basic construction	67.18	28.8
of which industrial and commercial taxes	119.18	52.7	2. Enterprise improve- ment and new product expenses	12.99	5.6
Taxes from state owned enterprises	52.37	23.2	3. Enterprise working	0.99	0.4
customs	15.16	6.7	4. Education, scientific, and health expenses: of which	37.99	16.3
Agricultural taxes	4.45	2.0	education was	21.43	9.2
2. Enterprise income	4.20	1.9	5. Defense	200.80	8.6
			6. Administrative expenses	16.80	7.2

	<u>Rural deposits</u>	<u>Rural loans</u>
	- - - Billion yuan - - -	
1980	23.984	17.588
1981	27.840	18.972
1982	32.994	21.245
1983	39.127	23.119
1984	37.243	36.808
1985	49.956	41.663
1986	55.964	57.037

of state funds for credits and loans, only about 7 percent was extended to agriculture.

Rural bank deposits increased again in 1987, and credit was extended so fast in the first 8 months that bank officials tightened lending, especially for investments in rural industry. Currently, most rural capital funds are used for consumption loans because living costs have risen much faster than net income and production expenditures. A recent survey revealed that only about half of China's farm families had financial reserves in bank savings deposits. People-to-people loans are gradually becoming important.

About 92 percent of farm family production expenditures is allocated to current output. On average, about 39 percent is spent on crop production; 30 percent on livestock output; 16 percent for services such as transportation; 13 percent on secondary production such as collecting wild herbs and plaiting wicker baskets; and 2 percent on other items. About 8 percent of farm family expenditures are used to purchase productive assets. Of that 8 percent, farmers averaged 26 percent for transportation machinery; 29 percent to buy livestock; and 24 percent to construct buildings. In 1987, they built 860 million square meters of housing, up 7.5 percent over 1986. Some of this new housing construction has several purposes, as residences, for industries, and to house livestock. Since 1980, construction has averaged 670 million square meters of house space each year. Limited funds were used to improve farmland, build wells, or construct irrigation and drainage ditches.

Why the lack of investment to improve the productive capacity in agriculture? One peasant succinctly remarked it was because of the "three littles—we have little to invest; there is little incentive to invest from what we can save; and there is little government investment." Farmers have seen rural policy

change many times in the past 30 years. Hence, even though current policy supports land contracts and specifies that they be extended for 15 years, farmers are uneasy about the longevity of contracts and the status of property rights. The legal status of land contracts remains unclear. Landmark court cases have yet to set precedents which will determine the compensation farmers will receive if they invest in the land and then contracts are revoked.

The government provides subsidies to both consumers and producers. However, USDA analysts have not been able to identify all of them, understand how they function, determine what effect they have, nor quantify their value. What is known is that during the reform period the government held urban retail food grain prices constant and increased the purchase prices of these commodities to stimulate production and to raise rural living standards. Government subsidies filled the gap between farm gate and urban retail prices. These subsidies rose nearly 400 percent from 5.6 billion yuan in 1978 to 27.5 billion in 1985 (see table 5). These subsidies, as a share of total state revenues, went from 5 percent in 1978 to 14.7 percent in 1985. The government also subsidized farm producers by providing input supplies at reduced prices. These subsidies fell 71 percent during the reform period, from 2.4 billion yuan in 1978 to 0.7 billion in 1985. A third state subsidy was provided to consumers and producers to cover the difference between the cost of imported grain, cotton, sugar, fertilizer, and agricultural chemicals, and domestic retail prices.

Adjustment over the next decade is expected as China's top authorities modernize the economy. Government subsidies will change and create new conditions of greater consumer choice, specialization, least cost calculations, profits, risk, and domestic and foreign competition. These adjustments inside China will affect producers and consumers participating in international markets.

For 1988, China's financial authorities have proposed revenues of 255 billion yuan and expenditures of 263 billion, leaving a deficit of 8 billion yuan. Investments in agriculture will increase 14.6 percent over 1987 to 15.3 billion yuan. This will raise agriculture's share of total expenditures to 5.8 percent, from 5.3 and

Table 5--- China's expenditures on agricultural subsidies

Year	Total	Subsidies to stabilize retail prices	Subsidies to support purchase of agricultural inputs	Subsidies to cover the difference between the cost of imported grain cotton, sugar, fertilizer, and ag chemicals, and retail prices
Million yuan				
1978	9386	5560	2391	1435
1979	18071	13602	2179	2290
1980	24207	17856	2041	4310
1981	32772	21772	2174	8826
1982	31836	24022	2135	5679
1983	34166	26952	1346	5868
1984	37000	32085	815	4100
1985	29947	27492	696	1759

Source: China Stat Yearbook, 1987, p.633.

5.5 percent in 1986 and 1987. During the first quarter of 1988, the Agricultural Bank and rural credit cooperatives increased their loans to farmers by 16 percent from a year earlier. [Frederick W. Crook (202) 786-1626]

AGRICULTURAL PRODUCTION

Agricultural production in 1987 was mixed. For the third year in a row grain production was below the 1984 record of 407 million tons. It was 402.4 million tons, 2.6 percent over 1986. The output of tea, flue-cured tobacco, silkworm cocoons, and fruit increased. After 2 years of declines, both oilseed and cotton outturn rose. Production of sugar-bearing crops, jute, and ambary hemp decreased. Aquatic products rose 14 percent in 1987, achieving the 9.4-million-ton target set for 1990.

Livestock production also had mixed achievements. Pork output slowed for the first time since the late 1970's, but total red meat increased because of more beef and mutton. The number of dairy cows exceeded 2 million and milk output rose 10 percent. The poultry industry began to be favored as an efficient converter of feed as feed grain supplies became tight.

Grain production in 1988 is expected to exceed the 1987 mark of 402.4 million tons. Area will decrease slightly, but yields are expected to increase by 1.8 percent. A wheat crop about the same as in 1987 is forecast. China's authorities report rice area in 1988

will be about the same as in 1987, but yields should increase, so a crop equal to last year could be harvested. Coarse grain outturn is forecast to decline 2 million tons to 93.2 million, primarily because of reduced sown area. Oilseed output is unclear. Preliminary reports suggest that rapeseed output will be down. Cotton production likely will be up because area is scheduled to increase from 4.9 million hectares to 5.3 million. Sugar-bearing crop output should increase because of the rise in the procurement price. Output of fruits and vegetables should continue to expand. Aquatic product outturn will expand, but probably at a slower rate than in 1987.

Livestock production in 1988 may expand slowly, primarily because of feed shortages. Pork production will remain the same as the past few years, but improvements will be made in feeding efficiency and in producing more lean hogs. With shortages of feed, authorities will try to increase the output of ruminant animals and poultry. Egg and milk production should expand.

Grain

Production Up in 1987

Total grain production including wheat, rice, coarse grains, soybeans, potatoes, and pulses increased 2.6 percent over 1986. Yields were up 2.6 percent, but there was little change in grain area at 110.9 million hectares (table 10). For the 1987/88 grain marketing year, China was again a net importer. Imports rose about 4 million tons to over 15 million,

while exports fell by more than 1 million to 5.5 million. Demand for grains in 1987/88 exceeded supply, and stocks were drawn down by over 8 million tons. Ending stocks in 1987/88 were just under 19 percent of grain available for consumption. Grain supply and use tables based on various marketing years appear in a special article on page 62.

About 3.5 percent of available grain is used for seed. Grain for feed use increased sharply in the last decade and now accounts for 24.5 percent of the total. In 1987, grain allocated for feed increased by almost 2 million tons to an estimated 90 million (feed rice included on a milled basis).

Wheat production in 1987 declined 2.6 percent to 87.7 million tons reflecting reduced plantings of winter wheat because of dry weather in autumn 1986. Spring wheat area also was down because of competition from cash crops and corn in northeast China. Total wheat yields at 3.03 tons per hectare were about the same as the 1986 record.

Rice output increased to 173.9 million tons, 1.7 million more than in 1986, but still below the 1984 record of 178.3 million. Area sown to rice decreased about 200,000 hectares to 32 million. Farmers shifted land out of rice into cash crops for more profit. Record yields in 1987 reached 5.42 tons per hectare, 1.5 percent above 1986. Expanding use of hybrid rice varieties helped boost yields (figures in million hectares).

<u>Year</u>	<u>Hybrid rice area</u>	<u>Year</u>	<u>Hybrid rice area</u>
1978	4.33	1983	6.70
1979	5.00	1984	6.60
1980	5.20	1985	7.33
1981	5.14	1986	8.96
1982	5.60	1987	10.96
		1990 plan	13.30

Dry weather in the spring reduced area and yields of early rice. Favorable 1987 fall weather boosted output of fall-harvested rice so farmers reaped their second best crop.

Coarse grain production rose to a record 95.8 million tons, 8.3 percent above 1986. There was a 3.2-percent increase in area and 5-percent better yields. Corn accounts for over 80 percent of coarse grain production. Corn area increased 5.7 percent to an

estimated record 20.2 million hectares, while area sown to other coarse grains remained constant or decreased. Corn yields increased 4 percent because of expanded use of hybrid seed, chemical fertilizer, and favorable weather, so output reached a record 78 million tons.

Production Likely Up in 1988

China's top political authorities will focus attention on grain production because of sluggish growth rates from 1985 through 1987. Also grain exports are down while imports are up. There are shortages and stocks are shrinking. Early this year newspaper articles daily discussed some aspect of the grain problem. Yet, only minor changes have been made to stimulate production. Slightly more investment funds will be available to the agricultural sector, more fertilizer will be produced, minor price adjustments have been made, and marketing organizations are being encouraged to speed up distribution of input supplies. These policies largely affect wheat, early and intermediate rice, soybeans, potatoes, and other grains sown before June which account for about 75 percent of total output.

The output of late-planted grain could be affected by price reforms, such as those in Guangdong province, if they are implemented before seeding begins. In Guangdong rice prices rose 105 percent from 0.292 yuan per kilo to 0.60 yuan. It was uncertain at the end of June if and when other provinces would follow Guangdong's price reform, which adds an above-average margin of error to the forecast. Output in 1988 should be up modestly because of current incentives and because most of the grain crop has been planted.

China's agricultural authorities have published a 1988 grain production target of 410 million tons. But output will be less because several hundred thousand fewer hectares were planted and the summer grain crop is smaller than expected.

Area sown to winter wheat increased in autumn 1987, and spring wheat area is expected to increase, so total wheat area will be 29.5 million hectares. But yields are expected to be down because of dry weather this spring in the Northwest Region, and in

Sichuan and Hubei provinces. Also Heilongjiang province, a major spring wheat producer, had some very heavy rains this spring which delayed planting.

Rice output may come close to the 1984 record of 178 million tons. If China's planners are successful, area sown to rice likely will be about the same as last year, 32.1 million hectares. With more chemical fertilizers available and expanded use of hybrid seed, yields could equal or surpass the 1987 record of 5.4 tons of paddy rice per hectare.

Coarse grain outturn for 1988 is expected to decrease primarily because of reduced area. More land for cotton and soybeans likely will mean less area sown to coarse grains. Also corn area likely will fall because the large crop last year swelled supplies and incentives are less.[Frederick W. Crook (202) 786-1626]

Oilseeds

China's 1987 oilseed production reached a record after a moderate decline in both output and area the previous year. The main increases were in the overwintered crops of rapeseed and cottonseed. Peanuts and soybeans increased by small margins, while the sunflowerseed crop took another significant downturn.

The rapeseed expansion is attributed to the rising demand for all edible oils and the revision of the procurement system in 1985. Upward adjustment of procurement prices for cotton, and emphasis on fertilizer bonuses and advanced payment, gave peasants better incentive to boost output last year.

Demand for vegetable oils continued to expand, mainly because of rising incomes. The state bought fewer oilseeds, and is therefore crushing and producing less edible oil. Coupled with lower world market prices for vegetable oils in 1987, China is the world's second largest vegetable oil importer after India.

To encourage domestic oilseed production and procurement during the 1988/89 marketing year, the government increased procurement prices for rapeseed, sunflowerseed, sesame, and other minor oilseeds. But significant improvement is not expected because

procurement prices are still less than those in rural trade markets. Moreover, the state does not provide oilseed growers with subsidized inputs as is done for grains and cotton sales.

China will continue to be active in world oil markets, as long as world prices stay relatively low and per capita income grows. China's vegetable oil imports will depend upon how successful the state system is in developing edible oil production.

Record Output in 1987

Oilseed production increased 7.6 percent in 1987 to 33.7 million tons. Total area increased 3.6 percent over the previous year and contributed approximately half of the production gain. Expanded area in soybean, cottonseed, and rapeseed crops (table 11) more than offset decreases in peanut and sunflowerseed area. Higher yields in 1987, about 3.8 percent, were responsible for the rest of the increase. The peanut crop, despite less area, registered the highest yield increase among all oilseeds last year.

Soybean output in 1987 reached a record 12.18 million tons, 4.9 percent above the 1986 record. Yield increases contributed about 70 percent of the growth in production. Area in 1987 expanded only about 1.2 percent over 1986. The biggest increase in output did not come from the Northeast Region, which produces about 40-45 percent of China's soybeans, but rather from Henan. That province regained its number two position after slipping to fifth place the previous year because of weather problems. Other major provinces were Shandong, Jilin, Anhui, and Jiangsu.

Cottonseed production in 1987 grew 19.8 percent to 7.2 million tons, reversing a 2-year decline after record output of 10.6 million tons in 1984. Raised procurement prices for cotton and last summer's dryness in the North China Plain were beneficial to cotton and cottonseed output. Area expansion in 1987 contributed most of the increase in production. China's overall availability of vegetable oils is low. The increase in cottonseed production means more oil for consumers. Crushing facilities have increased, especially dual-purpose cottonseed and peanut plants in northern provinces such as Shandong, Hebei, and Henan.

Despite a further decline in peanut area in 1987, higher yields raised output to 6.17 million tons (in shell), almost 5 percent above the previous year. Area in 1987 declined despite a higher procurement price. Farmers cut back because of their experience with the 1986 crop, which was strained by weather, and competition from other crops such as cotton in the north and fruits and vegetables in the south.

Rapeseed area grew 7.6 percent in 1987 after 33-percent and 5-percent surges in 1985 and 1986. Strong demand for vegetable oils and high negotiated and free market prices provided the incentive. The government is encouraging farmers to limit the expansion of rapeseed in favor of winter wheat. However, farmers prefer rapeseed because it improves the soil, reaps a higher income, and is harvested earlier, making fields ready for the next crop, such as early rice. Rapeseed yields were up 6 percent in 1987, best in the last 4 years. Output increased to a record 6.73 million tons last year, more than 14 percent over the 1986 record.

Sunflowerseed area continued to decline in 1987 to about 0.95 million hectares. The crop reportedly plagued with disease problems, and farmers were concerned because the crop rapidly depletes the soil of nutrients. The 1987 sunflowerseed output dropped to its lowest level in 6 years, only 1.35 million tons, 22 percent below the 1985 record.

Sesame seed production declined to the 1984 output level, about 550,000 tons. Sesame oil is a high value vegetable oil in China, but weak transportation and marketing systems, together with traditional crushing methods, prevent production from increasing rapidly. Other oilseed production, including castor beans, also declined because of smaller area and lower yields.

Oilseed, Meal Exports, and Oil Imports Continued

Despite strong domestic demand for oilseeds and meals in 1987, China continued exporting significant amounts of soybeans, peanuts, and various meals, such as soybean, rapeseed, and cottonseed. China's main incentive to export is to earn foreign exchange. The strong domestic demand for oil and foreign demand for meal is reflected in

China's soybean crush. In the last few years, it is estimated that the crush has increased from 20 percent of total soybean output to over 33 percent. Production of mixed feed is still quite low, about 25 million tons in 1987, and the proportion of soybean meal used in formulating feeds is small but increasing. Feed use of other meals is primarily limited to peanuts and sunflowerseed. The amount of rapeseed and cottonseed meal used in feed is limited by the toxic substance in them. The main meat animals raised in China are not cattle but hogs and poultry, sometimes including aquaculture. As a consequence, rapeseed and cottonseed meals are exported or used as fertilizer.

Soybeans are shipped mainly to Japan, the Soviet Union, and other Asian countries. Soybean meal exports go to Asian countries, with increasing amounts to Europe. Rapeseed and cottonseed meals are sold largely in European markets, including Denmark, West Germany, and the United Kingdom.

Vegetable oil imports continued strong in 1987 because domestic output did not meet the growing demand. In an effort to keep pace with rising demand and to take advantage of low world prices in 1987, China became the world's second largest vegetable oil importer after India. Efforts are also underway to modernize and improve the efficiency of the largely state-run crushing facilities. For example, plants using solvent extraction of soybean oil are replacing those using extrusion machinery. Modern peanut and cottonseed crushing facilities are being built, particularly in the North China Plain. Because demand is outstripping supply, consumption of vegetable oils is largely limited to the area in which the particular oilseeds are grown. In 1988, the government raised procurement for major oilseeds in order to boost domestic oilseed output. But China will likely continue edible oil imports. The mix of China's oil purchases will most likely continue to depend on prices of different oils.

Production To Be About the Same in 1988

Total production of oilseeds may not increase, because rapeseeds were reportedly seriously affected by bad weather during the winter. Rising income and improving diets are putting pressure on the production, use, and trade of China's oilseeds. Procurement prices

of all the major oilseeds have increased in the last few years to induce farmers to sell more to the state rather than in the free market. Prices of soybeans increased in 1986, peanuts and cottonseed in 1987, and this year prices rose for rapeseed, sesame, and sunflowerseed.

China's press reports that soybean area likely will increase in 1988. In 1987, it expanded significantly in Heilongjiang province, but output there increased only 1.5 percent. Heilongjiang is expected to slightly expand area this year. Assuming yields return to normal, Heilongjiang's production increase could push China's soybean output above the 1987 output of 12.18 million tons.

Farmers received a boost in the price paid by the state for rapeseed grown under contract. The basic price is 1.008 yuan per kilogram, compared with 0.936 the previous year. As a result, rapeseed area expanded again in 1988, but not as much as early reports because of adverse weather. Preliminary reports indicate the 1988 winter rapeseed crop may drop by 10 percent.

Cottonseed area also gained in 1987 by about 10 percent. Although there were no further price increases, output may increase 7 to 10 percent because of better field management and improved varieties.

For the 1988 peanut crop, some expansion is expected in area, although not to the 1986 peak. Because of new varieties, farmers are largely avoiding problems of genetic decline, and yields are expected to improve. Higher free market prices and stronger world market demand for peanuts are also expected. China's 1988 peanut output could increase from last year's 6.17 million tons, but is unlikely to surpass the 1985 record of 6.66 million.

Finally, sunflowerseed and sesame output should improve in 1988 because of higher yields. The price for each kilogram of sunflowerseed has been raised to between 0.056 and 0.08 yuan, and 0.232 and 0.236 yuan for sesame. Area sown to sunflowerseed and sesame crops should recover slightly, with output of each up about 10 percent over 1987, largely because of yield improvement.
[Francis C. Tuan (202) 786-1626]

Cotton

Cotton output rose more than 18 percent to 4.25 million tons in 1987, a reversal of sharp declines in 1985 and 1986. The increase mainly resulted from raised procurement prices. Good weather, particularly in the fall, also contributed to higher yields. Rising domestic cotton consumption, both mill and non-mill allocations for 1985 and 1986, and government-encouraged export expansion have greatly reduced China's cotton surplus. In 1988, cotton acreage reportedly continued expanding, and output is expected to be close to the new target of 4.5 million tons. China is expected to cut its exports in 1988 and likely in 1989 because of increased domestic demand.

Cotton Output Revived in 1987

Although good harvesting weather last fall helped cotton production a great deal, increases in procurement in the south and the north were mainly responsible for area expansion. Cotton area grew about 12 percent to 4.91 million hectares, still 2 million less than the record of 1984. Average yields improved almost 6 percent over 1986. Further yield improvement will be critical, as competition increases for arable land. One of the major reasons for lower yields in 1985 and 1986 was reduced use of inputs, such as fertilizer. In 1987, subsidies on chemical fertilizers and advanced payments to cotton growers were reaffirmed by central and local governments. The subsidies increased input use, although farmers still complained that input distribution was ineffective.

Good weather was favorable to cotton harvesting in 1987 and helped maintain the quality of the fiber. To improve cotton quality after the 1984 bumper harvest, farmers widely adopted new varieties, such as Lumian No. 6 in Shandong province and Ejing No. 1 and No. 92 in Hubei province. These varieties helped raise the average quality of the 1987 harvest. The replacement of low-quality cotton varieties, however, was not entirely cheerful news. In the last couple of years, mills and exporters were encouraged to use and export this cotton. They were reportedly so successful that now the country is short of domestic low-quality cotton for blending purposes.

Consumption Up Continuously; Ending Stocks Lower

The most recent information on China's mill use of cotton indicates that the textile industry used 2.6 million tons in 1985; 3.1 million in 1986; 3.6 million in 1987; and likely 3.75 million in 1988. This is the first time China has revealed its mill use of cotton for recent years. China raised its 1988 target to 4.5 million tons because of increased mill use, special non-mill use of 870,000 tons in 1985 and 1986, and more exports. The Seventh Five-Year Plan had called for 4.25 million tons in 1988.

Given sharply expanded uses and exports, and smaller output in the last 3 years, 1987/88 ending stocks were drawn down to about 2.05 million tons (9.4 million bales). These ending stocks are about 50 percent of consumption and are about half of what they were 3 years ago (figure 1).

Cotton Exports Continued Strong

Preliminary statistics indicate that the country's cotton exports reached 754,600 tons in calendar 1987, more than double those of only 2 years ago. China aggressively promoted cotton exports in 1987, indicating stocks were not as low as expected. Last year's improved output also helped exports.

China's authorities have continuously made commitments to export cotton despite the sharp decline in stocks. The number of

high-quality cotton production bases in 1987 totaled 72, accounting for more than 40 percent of total output. The success of these bases and the country's determination to balance the trade deficit have been the main forces behind the export growth. Cotton prices in international markets also have been favorable for exports.

In 1987, there were some internal transfer problems to maintain cotton exports. To solve them the government will give a bonus of 128 yuan for every ton of cotton transferred from one province to another. The policy is aimed at moving more cotton out of Shandong, Hebei, Henan, and Xinjiang provinces to facilitate trade and reduce local shortages which occurred in 1987.

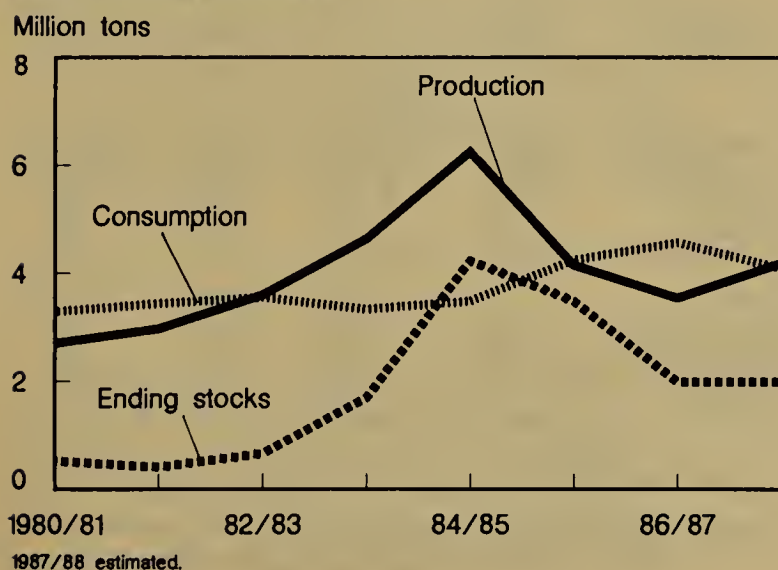
Output Up; Exports Down in 1988

Cotton output should grow again in 1988. Area may increase to the government target of 5.33 million hectares, about 8.6 percent over 1987 and near the target of 5.4 million set for the rest of this decade in the Seventh Five-Year Plan. The advanced cash payment and fertilizer bonus program implemented last year will continue in 1988. No other incentives have been added.

While cotton procurement prices are unchanged, purchase prices of some grains, such as wheat, corn, and rice, have been raised this year. Therefore, price ratios could be somewhat unfavorable to cotton where wheat or corn compete for land. However, most of the price changes for grains are not directly connected to competing land uses. For example, rice procurement prices have been increased mainly in north China, where area sown to the crop is comparatively small, and corn procurement prices raised in China's Southwest Region where little cotton is grown. For this reason, along with the increased profit from cotton in 1987, planted area could exceed the 5.3-million-hectare target this year. And given normal weather and average yields, production in 1988 could reach the targeted 4.5 million tons.

Cotton exports are expected to decline for the first time in 6 years because of lower stocks and lack of short staple varieties demanded in domestic and international markets. The target for 1988 exports is

Figure 1
**Cotton Production, Consumption,
and Ending Stocks**



unofficially 500,000 tons, down about 250,000 tons from last year. [Francis C. Tuan (202) 786-1626]

Other Crops

Tobacco, fruit, and aquatic products grew sharply in 1987, but sugar output dropped. Unfavorable price ratios between sugar and other crops, such as grains and fruits, were responsible. Sugar production should go up this year because of raised procurement prices.

Sugar Production Declined

Sugar crops in 1987 decreased moderately to 54.8 million tons. Sugarcane declined 7 percent to 46.85 million tons, and sugarbeets dropped 4 percent to just under 8 million tons. The preliminary sugar production estimate is down by about 150,000 tons to 5.1 million, raw value (table 6).

About 80 percent of sugar production comes from five provinces; Guangdong, Guangxi, Fujian, Yunnan, and Heilongjiang. Its importance in Guangdong and Fujian has declined the past couple of years because farmers can more profitably grow other crops and ship them to close export markets and prosperous domestic urban markets. In 1987, sugar area decreased in Guangdong, Fujian, and Heilongjiang; stayed about the same in Guangxi; and increased in Yunnan and Sichuan. There was an overall decrease.

Sugarcane and beet yields in 1987 were generally in line with those of the past 3 years. Yields were low because fertilizer and pesticides were not always available and were expensive relative to the profitability of cane and beets; and unimproved varieties were most often planted. The rural transportation system was inadequate, causing delays in shipping the crop to the mills. The government is encouraging cane farmers to adopt more early maturing, high fructose varieties by paying a bonus of between 5 and 20 percent. However, high yield seed cane is more expensive than traditional cane. This, coupled with unfamiliarity with the new variety, slowed the widespread use.

Despite the fall in production, the consumption of sugar increased to 7.1 million tons. Reportedly, the increase was allocated to the food processing industry. Consumption

has also been increasing in rural China where incomes have been growing. In late 1987, sugar stocks fell below levels considered adequate by the state. As a result, rationing was begun in most major cities, except Guangzhou, the capital of China's foremost cane-producing province. In general, rations allow for 1 kilogram a month for a family of three, or 1.5 kilograms for a family of four or more.

Because of the rapidly growing consumption and the decline in supplies of sugar, imports are expected to rise to an estimated 2.1 million tons for 1987/88. With fees for transporting, packaging, and processing, imported sugar cost \$486 a ton, about \$162 more than domestic sugar. Thus foreign exchange outlays for sugar will not be allowed to grow unchecked. The emphasis on increasing production domestically will continue. In 1988, sugarcane farmers will receive between 90 and 100 yuan for a ton delivered to the state, and 100 yuan for beets. This compares with 70 to 80 yuan for cane and 90 yuan for beets in the previous year. In addition to higher procurement prices, the government will offer preferential terms on bank loans and lower taxes to encourage the development of potential sugar-producing regions in Guangxi, Hainan, Guangdong, Yunnan, and Fujian.

The higher procurement prices for cane and beets may create further problems for sugar mills. Reportedly, China has the capacity to produce 6.3 million tons of sugar a year. However, crushing facilities reported losing money and depend on subsidies from the

Table 6—China's other agricultural product output

Product	1984	1985	1986	1987
1,000 tons				
Sugar crops	47,946	60,648	58,525	54,820
Sugarcane	39,519	51,549	50,219	46,850
Sugarbeets	8,284	8,919	8,305	7,970
Sugar	3,740	4,513	5,250	1/ 5,100
Tobacco	1,789	2,425	1,707	1/ 1,915
Flue-cured	1,543	2,075	1,374	1,640
Tea	414	432	460	497
Jute and hemp	1,492	4,119	1,420	960
Silk cocoons	357	371	369	397
Aquatic products	6,194	7,052	8,235	9,400
Rubber	189	188	210	1/ 230
Fruit	9,845	11,639	13,477	15,510

1/ USDA estimates.

Sources: China Stat Yearbook, 1984, 1985, 1986, and 1987; China Ag Yearbook, 1983, 1984, 1985, 1986, and 1987; and the 1987 SSB Communiqué.

central and local governments. In order to control the runaway costs of subsidies and the rapid growth of consumption, the government will very likely raise bulk and retail sugar prices all over China in the near future.

Tobacco Output Up in 1987

Tobacco output increased almost 14 percent last year to about 1.95 million tons. This compares with a decline of 30 percent in the previous year. Crop area expanded in all major tobacco-producing provinces in 1987, a result of higher procurement prices for upper grades and a refined grading system. On average, tobacco farmers received 1.3 yuan per kilogram in 1987, but only 1.0 yuan in 1986.

China's tobacco production remains overwhelmingly flue-cured, about 80 to 85 percent. Last year, flue-cured tobacco output reached 1.64 million tons, more than 19 percent over 1986. Rural people are now switching from the dark and air- and sun-cured tobaccos to flue-cured. Rapid expansion in cigarette production is stimulating more flue-cured output. Cigarette manufacture continued its double-digit growth in 1987. Filter cigarette production, which began in the early 1980's, has reached about one quarter of total output. Despite efforts to expand production, the demand for high-quality cigarettes far exceeds supply, and prices are rising.

The country's trade in tobacco is also dominated by flue-cured. China became a net importer of leaf in 1987 despite plans to remain a net exporter. China exports leaf to all parts of the world, especially Asian countries and Europe. Leaf imports are generally high quality. Currently, chief suppliers are Brazil and Zimbabwe. China's officials would like to raise the country's tobacco quantity and quality to the point where exports expand and imports are cut or eliminated.

Tea and Fruit Production Rose Continuously

Total tea output reached almost 500,000 tons, 8 percent over the previous year. The growth is attributed to the household contractual system and preferential treatment, such as priority in loans, fertilizer, fuel, and transport facilities given by the

state. There are more than 1 million hectares of land devoted to growing tea, and more than 90 percent has been contracted by individuals.

China mainly produces black, green, jasmine, and oolong tea. Green tea makes up more than 30 percent. China has more than 2,000 tea processing factories, half run by townships and villages. But 70 percent of the tea is processed by state-owned factories.

The country exports green tea to France, Pakistan, and the Middle East, and black tea to Britain and Eastern Europe. Oolong tea goes to Japan, Southeast Asia, and Hong Kong.

Fruit production continued its rapid growth, reaching 15.5 million tons, a 15-percent increase. Preliminary statistics indicate that in 1987 farmers picked about 2.99 million tons of apples, 1.26 million tons of bananas, and 216,500 tons of dates. Total citrus fruit output probably reached 2 million tons in 1987. Orange production increased, particularly in Guangxi. The province harvested 8,000 tons of oranges last summer, 5.2 times the 1985 figure. The production base is scheduled to hit a record harvest of 30,000 tons this year. Most of the oranges produced from the base have been sold to Hong Kong, Australia, the Soviet Union, and the United States.

Aquatic Products Up Sharply

In 1987, China harvested more than 9.4 million tons of aquatic products, 14.1 percent more than the previous year and surpassing the state target of 9 million tons set for 1990. Domestic consumers average 8 kilograms of aquatic products per person per year, compared with about 18 kilograms of meat and 5.5 kilograms of eggs.

Of the country's total aquatic production last year, 4.24 million tons came from marine fishing, 4.1 million tons from inland freshwater catches, and the remaining 1.05 million tons from offshore fish farms. According to the Aquatic Production Bureau, Ministry of Agriculture, Animal Husbandry, and Fisheries, the country expanded its fish ponds by 83,000 hectares in 1987.

Fish farmers face higher production costs because the price of feed has risen sharply in recent years. The Aquatic Production Bureau

plans to increase the output of feed by another 500,000 tons to nearly 10 million tons this year. [Francis C. Tuan (202) 786-1626]

Livestock

Pork production, the core of China's livestock sector, dropped in 1987 for the first time since the late 1970's. However, red meat output increased slightly because of more beef and mutton. The growth rate of China's livestock sector declined for the third consecutive year because of below-record grain production. Strong and growing demand for livestock products forced large cities to resume pork rationing toward the end of 1987. Slow development of the sector is expected in 1988, with milk, poultry, and egg production growing relatively faster. Long-term growth of livestock output is expected to be considerably slower, compared with the optimistic prospects of only a few years ago. The change mainly reflects a slowdown in grain production to the year 2000.

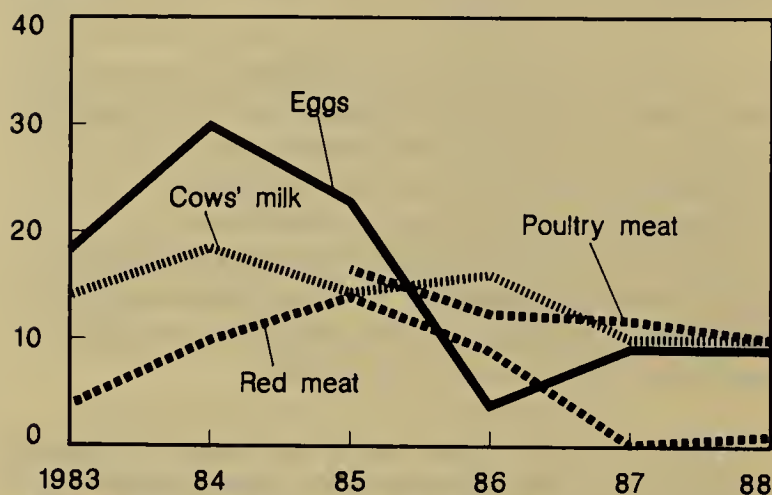
Growth Strained in 1987

Livestock products continued to expand in 1987, but at slower rates than the previous year (Figure 2). Total red meat, including pork, beef, and mutton, grew only 0.2 percent to 19.21 million tons (table 13). Pork output before 1987 had led the meat expansion since the rural reforms started in the late 1970's. With two consecutive years of below-record feed grain production, 1987 pork dropped. The decrease, although only 160,000 tons from the 1986 record, was the first since the late

Figure 2

Annual Growth Rates of Major Livestock Products

Percent



1987 estimated for eggs and poultry meat. 1988 estimated.

1970's. Many big cities, including Beijing, Tianjin, and Shanghai resumed pork rationing late in the autumn of 1987. Demand for lean pork, however, has been growing continuously, particularly in urban areas. Improved breeds have provided more of it to the markets, but output still cannot meet the demand.

The year-end hog inventory was down 3.2 percent from 1986 to 326.4 million head. The number of hogs slaughtered decreased about 1 percent to 255.13 million. As a result, the annual slaughter rate plummeted again, after a slight decline in 1986. Less slaughter reflected a smaller pig crop caused by the decreased availability of feed grains.

Slaughter rates of ruminant animals, including cattle, sheep, and goats, continued to improve in 1987. Beef production has made significant growth in the last 3 years, in contrast to the slower increase in mutton output. Beef surpassed mutton in 1987 for the first time since China's official publication on livestock product output started in 1979. The rapid growth of beef production is likely linked to the rapid increase of dairy cattle around big cities. Young dairy steers are now raised for beef instead of being culled. Another factor was higher beef prices resulting from the elimination of government fixed-price policies.

Production of dairy products, particularly cow's milk, continued growing rapidly in 1987, although the increase is slowing. Cow's milk rose to 3.19 million tons, 10 percent above the previous year. Dairy cows now total more than 2 million head, compared with only 558,000 in 1979.

China's dairy industry has grown rapidly in recent years, particularly in big cities, because of the assistance of the World Food Program (WFP). The WFP supplied 45,000 tons of skimmed milk powder and about 13,330 tons of butter oil between 1984 and 1988. The project helped dairies to reconstitute the two products and mix them with fresh milk to increase supplies in large urban centers, such as Beijing, Tianjin, and Shanghai. The project also provided technical assistance in raising and managing dairy cows and in storing and marketing milk. The European Economic Community (EC) and China have signed an agreement to continue a similar project, and expand the assistance from WFP's six cities to 20 major cities after 1988.

Poultry and egg production continued to expand last year, but more slowly. Although feed manufacturing reportedly reached about 25 million tons, 7 million over the previous year, higher coarse grain prices prevailed in local rural trade markets. These higher prices drove many individual households specializing in poultry and egg production out of business. However, higher incomes, rising procurement prices, and shortages of lean pork, in contrast, have contributed to continued growth of poultry and egg output.

Wool output rose significantly in 1987, following a slight increase the previous year and three consecutive years of decline before 1986. Production reached 208,000 tons, up 12.4 percent. In 1987, wool prices rose dramatically and stimulated domestic supply. China's textile industry will continue reforms of wool marketing by allowing more auction sales of raw wool in both Inner Mongolia and Xinjiang Autonomous Regions. Instead of depending solely on the government for supplies, factories are now permitted to buy the material directly from farms or import it with foreign exchange earned or supplied by their local governments.

China's supply of wool has always been short and domestic spinners required 170,000 tons of clean wool. But domestic cleaning capacity was only 70,000 tons. This meant that 100,000 tons had to be imported, mainly from Australia and New Zealand. In 1985, China imported only 30,000 tons of wool. The lack of pastures and the failure to improve sheep breeding are likely the main reasons for the country's wool shortage.

Slow Expansion Again in 1988

Expectations of fast growth in China's livestock production, as in the mid-1980's, are now completely reversed, because of slow development of grain crops in the last 3 years and limited improvement for the rest of the century. Total meat output for 1988 is expected to gain slightly, with pork production remaining about the same as in the last couple of years and with larger gains in ruminant meat and poultry. Ruminant meat and poultry contribute only about 15 percent of China's total meat production. Egg and poultry

production could maintain the faster growth rate of the last 2 years because poultry can convert feed into meat at a better rate than hogs, cattle, or sheep.

Recent reports have revealed that pork rationing, which started late last fall in many large cities, has been discontinued. The discontinuation shows a quick turnaround in response to lower feed prices because of a record 1987 corn crop, higher pork prices, and a variety of government incentives to hog farmers, such as subsidized feed. The termination of rationing at a date earlier than expected seems to indicate two developments in consumer preferences. First, many urban consumers would rather pay twice as much for higher quality lean pork at free markets instead of purchasing the full 1 to 1.25 kilograms of fatty pork at state prices from the rationing system. Second, a substantial number of urban consumers are diversifying their diets by buying less pork and more beef, mutton, chicken, and fish. High prices for pork on free markets have made beef, mutton, and some cheaper fish attractively priced.

Manufactured feed output will continue to grow and provide for more poultry and eggs. Milk output should increase about 10 percent in 1988, as in 1987. The World Food Program (WFP) will expire at the end of this year. The EC and China have worked out a project to help the progress of dairy development in 20 major cities over the next 5 years.

Under the project, the EC will donate 45,000 tons of skimmed milk powder and 16,700 tons of butter oil. The dried milk and butter oil will be turned into about 500,000 tons of milk, which would bring in about 300 million yuan between 1988 and 1992. Part of the sales will be used to finance local dairy development projects. The money will help cooperatives and individual farmers buy dairy cattle, improve milk collection and distribution facilities, and upgrade and construct new processing facilities. The EC aid is badly needed in China, because the dairy industry is far behind world standards. While per capita milk consumption will be only 4 kilograms in China this year, it almost doubled in the last 5 or 6 years. [Francis C. Tuan (202) 786-1626]

CHINA'S GRAIN SUPPLY AND USE BALANCE SHEETS

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Abstract: This article reports the major findings from a research project to study China's grain supply and use. The article provides background information on how China's authorities use grain supply and use tables. It explains how USDA constructed balances for China's grains and what assumptions were used. It presents data on total grain supply and use, and summarizes information for wheat, rice, and coarse grains. Detailed supply and use tables help gauge the pressures on China's grain situation.

Keywords: Grain production, imports, exports, stocks, seed use, feed use, food use.

Total Grain

China is the world's largest producer of grains. Output increased from 125.6 million tons in 1960 to 350.2 million in 1987, an annual average increase of 3.9 percent. Unless otherwise specified, total grain in this article refers to wheat, rice on a milled basis, corn, sorghum, millet, barley, oats, soybeans, potatoes, and other grains. During 1960–87, area sown to grain decreased 7.8 percent to 111.1 million hectares. Yields increased at an annual average of 4.3 percent (table 7). China's statistical authorities define grain to include wheat, rice, coarse grains such as corn, sorghum, millet, barley and oats, potatoes (converted to a dry-weight basis on a 5-to-1 ratio), soybeans, and other grains such as beans, peas, other pulses, and buckwheat. A milling rate of 0.7 was used to convert paddy rice to a milled rice basis. Total grain output in 1987 with rice measured on a paddy-weight basis was 402.4 million tons.

China has been a net importer of grain for all of the past 28 years except 1984 and 1985. During 1960–87 China imported an average of 7.9 million tons each year and exported an average of 2.6 million.

Grain stocks were estimated to be only 7 percent of grain available for consumption in 1960. Output plummeted during the Great Leap Forward (1958–61) so that authorities drew stocks down sharply to maintain consumer grain rations. Authorities probably built up grain stocks in the 1960's, so that by 1970 the stock-to-availability ratio rose to

about 18 percent. The buildup continued in the 1970's so that by 1980 the ratio was above 30 percent. In recent years grain use probably outpaced supplies, and stocks were drawn down, so that by 1987 the stock-availability ratio fell to below 20 percent (see figure 3).

In the past 28 years, grain for feed use expanded significantly. China's livestock industry, in terms of number of animals and meat output, expanded dramatically (6). For example, meat output rose from about 2 million tons in 1960 to over 19 million tons in 1987, an increase of 850 percent. In 1960 only about 12.5 million tons of grain were fed to animals, about 9 percent of total grain availability. By 1987 over 90 million tons were fed, up more than 600 percent and equaling just under one-fourth of grain available for consumption.

Figure 3
Total Grain Supply and Use

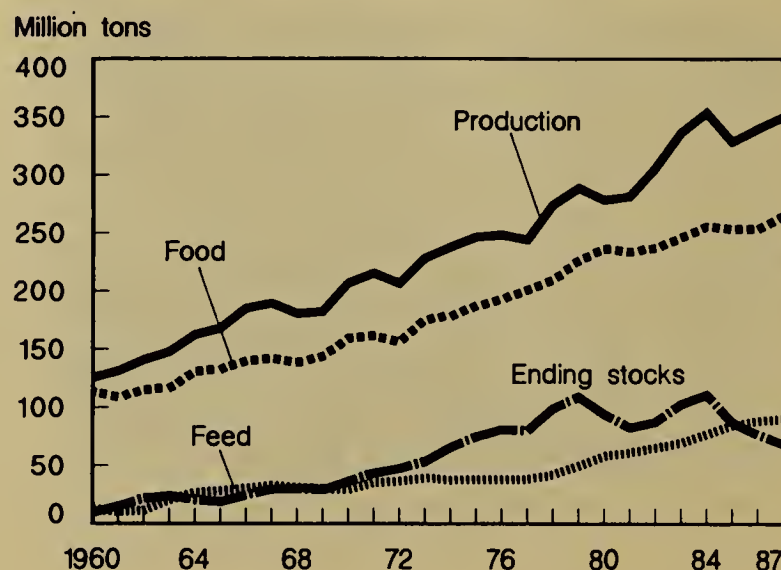


Table 7—China's total grain supply and distribution, 1960-87 1/

Crop Year	Area harvested	Yield	Production	Beginning stocks	Total Imports	Total Exports	Total consumption	Feed use	Seed use	Food consumption	Beginning stocks	Change In stocks	Ending stocks
2/	1,000 Ha.	Tons/Ha.											
1960	122,429	1.026	125,581	20,200	2,642	812	138,011	12,477	12,299	113,131	20,200	-10,600	96,00
1961	121,433	1.082	131,408	9,600	6,081	941	131,048	10,066	12,163	108,763	9,600	5,500	15,100
1962	121,621	1.160	141,104	15,100	5,231	1,150	138,585	11,355	12,275	115,036	15,100	6,600	21,700
1963	120,741	1.225	147,870	21,700	5,998	1,488	149,980	20,356	12,789	116,996	21,700	2,400	24,100
1964	122,103	1.332	162,600	24,100	5,357	1,981	169,876	26,712	12,395	130,814	24,100	-3,900	20,200
1965	119,627	1.406	168,209	20,200	6,344	2,311	173,642	28,200	12,276	133,089	20,200	-1,400	18,800
1966	120,988	1.532	185,583	18,800	5,089	2,317	182,455	30,346	12,611	139,686	18,800	5,700	24,500
1967	119,230	1.591	189,714	24,500	4,269	1,928	187,055	32,766	12,217	142,177	24,500	5,000	29,500
1968	116,157	1.556	180,696	29,500	3,538	1,721	182,013	31,019	12,276	138,707	29,500	500	30,000
1969	117,604	1.551	182,450	30,000	5,131	1,726	186,855	30,019	12,566	144,280	30,000	-1,000	29,000
1970	119,267	1.735	206,958	29,000	3,669	1,801	201,326	29,042	12,909	159,457	29,000	7,500	36,500
1971	120,846	1.784	215,579	36,500	3,402	2,196	209,785	35,146	12,964	161,656	36,500	7,000	43,500
1972	121,209	1.703	206,474	43,500	6,500	3,236	205,738	36,500	12,987	156,205	43,500	4,000	47,500
1973	121,156	1.885	228,414	47,500	8,424	2,670	228,268	39,363	13,193	175,800	47,500	5,900	53,400
1974	120,976	1.968	238,099	53,400	6,308	2,305	229,702	37,453	13,226	179,087	53,400	12,400	65,800
1975	121,062	2.039	246,847	65,800	2,339	1,419	238,567	38,015	13,342	187,308	65,800	9,200	75,000
1976	120,743	2.059	248,564	75,000	3,411	1,387	244,488	37,960	13,100	193,364	75,000	6,100	81,100
1977	120,400	2.028	244,155	81,100	8,847	1,663	252,439	38,091	13,259	201,078	81,100	-1,100	80,000
1978	120,587	2.276	274,496	80,000	11,478	1,441	265,233	42,255	13,170	209,860	80,000	19,300	99,300
1979	119,263	2.423	288,990	99,300	11,725	1,441	289,174	49,700	13,162	226,450	99,300	10,100	109,400
1980	117,234	2.376	278,583	109,400	15,290	948	308,025	58,300	12,843	236,958	109,400	-15,100	94,300
1981	114,948	2.452	281,834	94,300	15,269	819	307,884	61,300	12,702	233,963	94,300	-11,600	82,700
1982	113,463	2.697	306,021	82,700	15,775	991	315,805	65,400	12,766	237,631	82,700	5,000	87,700
1983	114,047	2.952	336,615	87,700	9,931	2,304	328,842	69,800	12,856	246,254	87,700	15,400	102,300
1984	112,884	3.134	353,833	103,100	7,640	2,860	345,513	77,200	12,621	255,876	103,100	8,100	111,200
1985	108,845	3.018	328,539	111,200	7,814	9,374	351,079	84,500	12,602	253,780	111,200	-24,100	87,100
1986	110,933	3.064	339,846	87,100	11,551	6,964	354,733	88,500	12,650	253,562	87,100	-10,300	76,800
1987	110,919	3.158	350,231	76,800	15,350	5,509	368,172	90,200	12,777	265,182	76,800	-8,100	68,700

1/ Total grain in this table refers to wheat, rice on a milled basis, corn, sorghum, millet, barley, oats, soybeans, potatoes, and other grains.

2/ Total grain is the sum of various individual grains by USDA specified crop year: Jun.-Jul. for wheat, Aug./Jul. for rice, Oct./Sep. for coarse grains, Sep./Oct. for soybeans, and calendar year for potatoes.

Grain used for seed was estimated from seeding rates published in an agricultural technical handbook (1). The quantity of seed used for a given crop was calculated by multiplying the seeding rate times the sown area for a specific crop in the subsequent year. Total seed used is the sum of seed sown for individual crops. Because constant seeding rates were used and because the area sown to grain crops declined slightly, seed use likewise did not change much during 1960-87.

In 1957 consumers had 225 kilos of food grain per capita, a condition they would not experience again for 22 years. Mismanagement of the economy during the Great Leap Forward caused per capita food grain availability to decline 25 percent to only 169 kilos in 1961. Per capita food grain consumption rose to an estimated 194 kilos by 1970, and by 1979 it reached 233 kilos. By 1987 per capita food grain consumption rose to 252 kilos, only 12 percent more than in 1957. But since more than 400 million people were added to the population in this period, increasing per capita grain consumption, especially in the past few years, is a credit to the genius and energy of China's farmers.

Grain Supply and Use Tables in China

China's administrative authorities have nearly 3 decades of experience using grain

supply and use tables. In the mid-1950's China's leaders dismantled the centuries-old grain marketing system and implemented the "planned purchase and planned supply system." A huge bureaucracy developed to assess demand for grain, purchase available supplies and transport, export, import, store, process, and retail grains and grain products. Individual farmers and rural economic cooperatives were forbidden from buying and selling grain. The state had monopsony purchasing power—it was the only grain buyer.

Officials used the concepts of grain supply and use balances to implement this system. Commune officials constructed balance sheets for production teams. They estimated grain output and food grain requirements for all consumers in the team based on sex, age, and physical activity requirements. They calculated the seed requirements and the amount of grain which could be spared to feed animals. Teams were classified as deficit, self-sufficient, or surplus, depending on whether grain production was less than, equal to, or greater than requirements. Surplus teams were required to sell a large portion of their surplus to the Government at a fixed price. The remaining surplus could be sold to the state at above quota prices or negotiated prices, fed to livestock, or consumed by members of the team as food grain. Purchased grains were

transported to grain stations (usually located in commune centers or on road, canal, or rail connections).

Similar grain balances were worked out for counties and provinces. Officials at the national level appear to have used balance sheet data from lower administrative levels to determine proper levels of grains to be a) shipped from one province to another, b) exported, c) imported, d) allocated for industrial uses, and e) withdrawn from or added to stocks. Annual grain procurements averaged around 25 percent of total grain production. When grain output hit a record 407 million tons in 1984, the system purchased 117 million tons, about 29 percent of total.

China's grain marketing system was revamped from 1979 to 1985 as part of Deng Xiaoping's economic reform package. The commune system was dismantled and production team lands were contracted out to individual farm households. Local cadres ceased constructing balance sheets for disbanded production teams. In 1985 cadres in grain stations made contracts with individual farmers to purchase grain. Additional quantities of grain were scheduled to be purchased in markets at negotiated prices. The contracted quantity was reduced from 117 million tons in 1984 to 50–60 million tons in 1985 so that farmers would benefit from the higher purchase prices in the free markets. The state continued to subsidize and distribute grain rations to consumers in urban areas.

In 1986 the author discussed the use of balance sheets with national and local authorities. Officials said in spite of the great changes in the grain procurement system, cadres employed by the Grain Bureau continued to construct balance sheets to understand the demand and supply of grains in their respective jurisdictions. In addition, local administrative cadres construct supply and use tables to assess living standards and welfare requirements.

Construction of USDA's Grain Supply And Use Tables for China

The basic identity used in this project was that the uses of grain equaled the supply of grain. Elements of the supply side include production (Pd), beginning stocks (Bs), stock changes or ending stocks (Es), imports (Im) and

exports (Ex). Use elements include seed (Sd), feed (Fe), and food consumption (Fo). Each part of this identity is equal to total grain available for consumption (Tc).

$$Pd + Im - Ex + Bs - Es = Tc = Fe + Sd + Fo$$

Industrial use and waste are included in food consumption numbers. The food consumption estimated by USDA should be higher than estimates from China because the USDA figure includes industrial use and waste.

The first step in the research project was to assess the availability of data. China's State Statistical Bureau (SSB) and Ministry of Agriculture published time series data for many grain crops from 1949 to the present. The grain balances in this exercise have been limited to 1960–1987, which parallels the database held by the U.S. Department of Agriculture. The USDA is primarily interested in the balances for wheat, rice, corn, sorghum, millet, barley, and oats. To make estimates for the crops the Department is interested in, however, balances had to be worked out for all the grain crops defined by the SSB.

The SSB has published production, export, import, and seed data for total grain, wheat, rice, soybeans, and potatoes from 1960 to 1986. The SSB has published incomplete area and production data for corn, sorghum, millet, barley, and oats. There are no stock data for any grain crop, and food consumption data were found only for total grain. Only fragmentary information was found for individual feed grain use. This inventory of available and missing data (table 8) served to shape the research effort, which used existing data to estimate missing grain production figures on the supply side and to use qualitative information to estimate grain use.

The second step was to estimate production numbers for selected grains for specific years so that the supply side of the identity equation would be complete. Data recently published by the SSB enabled analysts to estimate missing values for 1949 through 1987. The publication of *China's Coarse Grains: Production, Area, and Yield Estimates, 1949–85* estimated area, yield, and production values for the missing years for corn, sorghum, millet, barley, and oats (4). Having completed the work on the supply side of the identity equation, attention turned to the use side.

On the demand or use side, the basic strategy was to estimate seed and feed use, and adjust individual grain stocks so that changes in total food grain consumption would parallel changes in food grain consumption data published by the SSB.

The third step was to find a way to estimate seed use. Fortunately *Agricultural Technical Economic Handbook*, published in Beijing in 1983, gave seeding rates for the various grain crops (1). Generally we applied the given seeding rate, multiplying that rate times the sown area for the crop for the next year. Also seeding rates in neighboring countries were examined to make sure that seeding rates in the handbook were generally parallel.

In the fourth step published data were used to help estimate feed use. In the early 1980's, a number of authorities in China published data on feed grain use. Also, the SSB published a time series on pork, beef, and mutton production. Livestock output estimated in Francis C. Tuan's *China's Livestock Sector* was used to estimate feed grain use (6). He used grain conversion ratios to estimate the quantity of grain necessary to produce a given amount of meat. USDA used both the published estimates and the derived feed required to produce livestock products to make an estimate of total feed grain use.

Feed use had to be estimated for each individual grain, and the estimate for each individual crop had to be internally consistent

Table 8-- Grain supply and use data available, 1960-86

Year	Total grain	Wheat	Rice	Soybeans	Potatoes	Other grain 1/
	APE I FSCs	APE I FSCs	APE I FSCs	APE I FSCs	APE I FSCs	APE I FSCs
1960	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1961	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1962	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1963	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1964	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1965	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1966	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1967	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1968	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1969	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1970	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1971	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1972	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1973	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1974	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1975	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1976	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1977	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1978	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1979	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1980	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1981	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1982	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1983	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1984	APE I SC	APE I S	APE I S	APE I S	AP S	AP
1985	APE I S	APE I S	APE I S	APE I S	AP S	AP
1986	APE I S	APE I S	APE I S	APE I S	AP S	AP

Blank spaces indicate no official, derived, or estimated available.

A = Area data are available.

P = Production data are available.

E = Export data are available. Export data comes from FAS CIRCTRACE.

I = Import data are available. Import data comes from FAS CIRCTRACE.

F = Feed data are available.

S = Seed data are available.

C = Consumption data are available.

s = Stock data are available.

1/ Area and production data for other grains are derived as a residual.

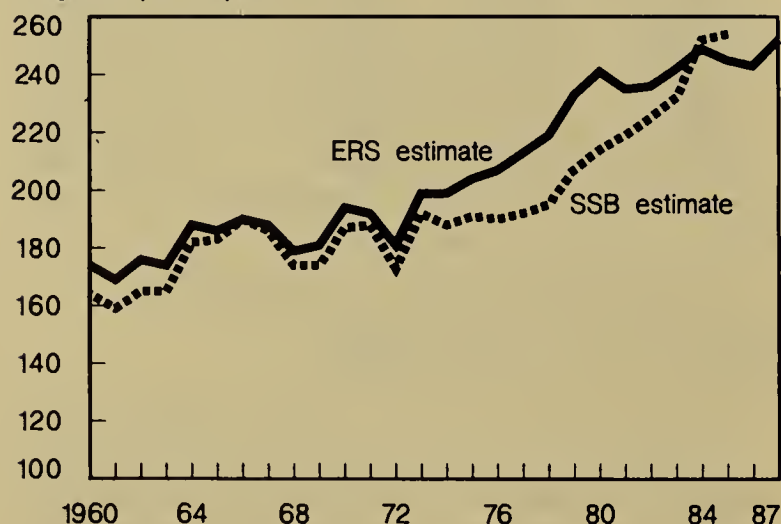
with other uses for that grain. Also, the sum of the feed for the individual grains had to equal total feed use. Initial feed use estimates were based on information gleaned from foreign travelers' trip reports and from articles and books (3). The initial estimate had to be revised because too large a portion of coarse grains were used for feed. Also, feed shares for potatoes and rice were increased.

The next problem was how to distribute the coarse grain feed estimate among the five coarse grains (corn, sorghum, millet, barley, and oats). From trip reports and published materials we concluded that millet in China is used primarily as a food grain. Therefore, the wheat feed use ratio to total wheat available for consumption was used to calculate the quantity of millet feed use. This amount was subtracted from the initial coarse grain feed use quantity to obtain a revised coarse grain feed use number. Since there was little available information about feed use for the remaining coarse grains (corn, sorghum, barley, and oats) it was decided to allocate the remaining feed among the grains based on the assumption that the ratio of an individual coarse grain feed use to the revised total would parallel the ratio of its output to the revised total as follows:

$$\frac{\text{corn production}}{\text{revised coarse grain production}} = \frac{\text{corn feed use}}{\text{revised coarse grain feed number}}$$

Figure 4
USDA and SSB Food Grain Consumption Estimates

Kilograms per capita



In the fifth step, USDA used total food grain consumption data (1960–84) found in *Trade and Price Statistical Materials* published by the SSB (5). Food consumption for individual grains was netted out from grain available for consumption less seed and feed. Factors such as changes in yearly production and stock policy were used to adjust annual changes in individual grain stocks. These stock numbers were adjusted until the total annual changes in food consumption paralleled that found in the SSB food grain consumption series (figure 4).

Wheat

China is the world's third largest producer of wheat. About 85 percent of the crop comes from winter wheat and the remainder from spring wheat. Per capita output doubled from 22 kilos in 1961 to 43 kilos in 1977. Reforms were instituted after 1978, and per capita production rose rapidly from 56 kilos to 83 in 1987. Demand for wheat exceeded domestic supplies, and from 1960 to 1987 China imported an average of 6.9 million tons a year (figure 5). China exported minor quantities of wheat from 1960 through 1974, but none since 1975. Stocks were drawn down sharply to keep up consumption levels when output fell during the Great Leap Forward (1958–61). China's grain authorities probably increased stock levels during the 1960's to over 20 percent of total wheat available for consumption. This ratio soared even higher during the 1970's, but decreased in the mid-1980's because of the slowdown in output and the rapid increase in demand.

Wheat is in great demand for food uses, but little is used for feed. Wheat used for feed is estimated to have averaged just over 1 percent of total wheat available for consumption in the early 1960's. This percentage rose to over 2 percent in the mid-1980's as production expanded rapidly. In summer 1986 the USDA Beijing Agricultural Counselor and the author interviewed numerous national and provincial officials who claimed that very little wheat is fed to livestock. The officials said that wheat bran from flour mills was commonly used as a livestock feed. Preferred feed grains include corn, sorghum, barley, oats, soybeans, and potatoes, but farmers may also feed some wheat, rice, and millet. Where local transportation systems are not well developed,

farmers use some of the preferred food grains as feed because they cannot be shipped out to fetch a higher price, and it is costly to bring in feed grains. Also, preferred food grains sometimes are used as feed when they are damaged by insects, rodents, or mildew.

Wheat seed estimates in the balance sheet are based on seeding rates from the *Agricultural Technical Economic Handbook* (1). Seeding rates were given for both spring and winter wheat growing regions. The seed use for a given year is based on the seeding rate times the area sown to wheat in the subsequent year.

Most of the wheat supply is milled into flour and is used in foods such as noodles, steamed dumplings, breads, and pastries. The quantity of wheat noted in the balance as food use is derived from total wheat available for consumption less feed use and seed use. Industrial uses of wheat and waste are included in food consumption figures. It is important therefore to remember that per capita wheat consumption figures also include some industrial use and waste.

Per capita wheat consumption rose from 29 kilos in 1960 to 48 in 1977, and then from 48 kilos in 1978 to 92 in 1987. The demand for wheat products apparently has been sensitive to the rapid rise in income in both urban and rural areas during the reform period. Data from rural sample surveys show that per capita consumption of fine grains such as wheat and rice increased 72 percent from 123 kilos in 1978 to 212 in 1986. Meantime, the

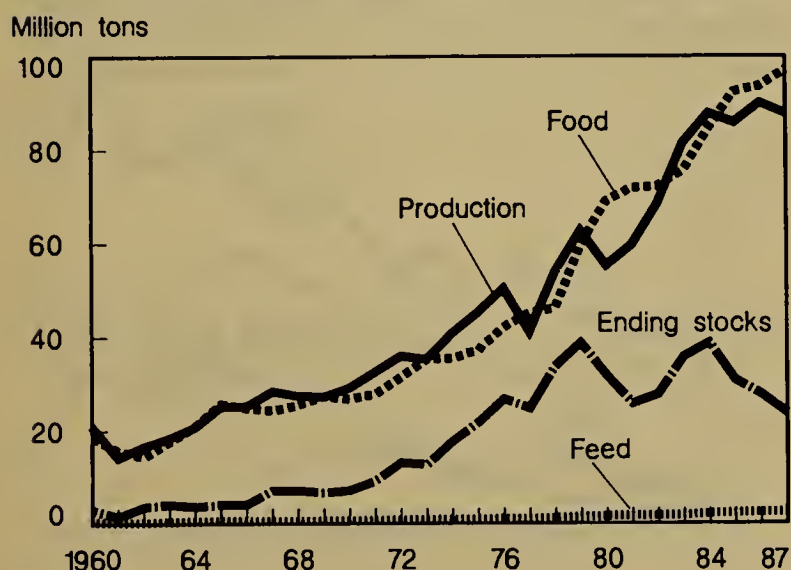
consumption of other grains such as corn, sorghum, barley, potatoes, soybeans, and pulses declined from 125 kilos in 1978 to 47 in 1986 (2).

Rice

China is the world's largest rice producer, and rice accounts for about 40 percent of total grain output. Several crops are harvested each year: the early crop, intermediate and single crop late, double crop late, and the northern crop. Per capita production increased 56 percent from 64 kilos in 1960 to 100 kilos in 1978. Unlike wheat output, which expanded rapidly during the reform period, rice production increased only 16 percent, from 100 kilos in 1978 to 116 kilos in 1987. Since 1960, China has been a net rice exporter shipping an average of just under 1.2 million tons per year and importing an average of 65,000 tons a year (figure 6).

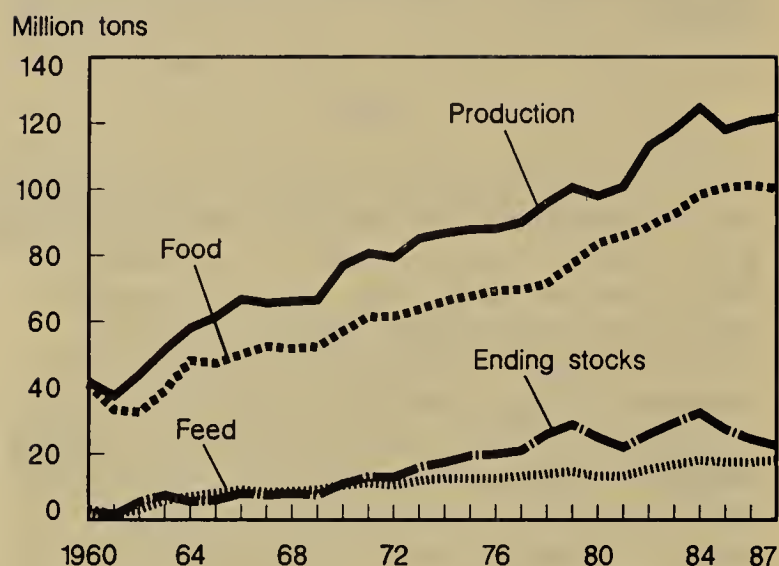
Rice stocks were low during the Great Leap Forward because of the sharp drop in rice and total grain production. It is estimated that rice stocks constituted only a little more than 6 percent of total rice available for consumption in 1960, but grain authorities more than doubled this ratio by 1970. Stock building continued during the 1970's so that by 1980 the ratio of stocks to available consumption rose to over 20 percent. A slowdown in the rate of increase in rice production, coupled with increased demand for rice as a food and a feed grain in 1985-87, resulted in stock drawdowns to maintain consumption levels, and the ratio fell below 20 percent in these 3 years.

Figure 5
Wheat Supply and Use



A considerable quantity of rice is fed to livestock. Initially it was thought that only small amounts of this valuable food grain would be fed to animals, but it became clear as the balance sheets were studied that the only way a balance could be attained was to show fairly large amounts of feed rice. Subsequently it was found through discussion with China's agricultural officials that by the mid-1980's large quantities, indeed, were being fed. In 1960 probably less than 5 percent of the rice crop available for consumption was fed to animals. But as economic conditions improved after the Great Leap Forward, farmers began to feed more rice, so that by 1970 just over 14 percent of the crop was fed. Transportation problems

Figure 6
Rice Supply and Use



seem to underlie farmers' use of this prized food grain as feed. Lack of local transportation facilities made it costly for the state to move rice from surplus to deficit areas and also to international markets.

Local authorities saw full granaries and relatively high per capita food consumption, and encouraged farmers to convert rice into animal protein by feeding livestock to improve the variety and quality of the diet.

Seed estimates are based on rates given in the *Ag Tech Handbook* (1). A mid-point of 188 kilos per hectare was used in the given seeding rates, which ranged from 150 to 225 kilos per hectare. Farmers seldom sow rice seed directly onto paddy fields, but rather prepare seed beds, sow seeds, and transplant the seedlings into paddy fields.

Most of China's paddy rice is milled and consumed directly as a food grain. The milling rate is estimated at 0.7. The data in the rice balance sheet have been calculated on a milled basis. Per capita rice consumption expanded slowly, from an estimated 63 kilos in 1960 to 70 kilos in 1970. In the next decade per capita consumption expanded to 85 kilos in 1980 and 95 kilos in 1987. The percentage of rice consumed as food decreased from 88 percent in 1960 to around 80 percent by the mid-1960's and has held fairly constant to the present.

Coarse Grains

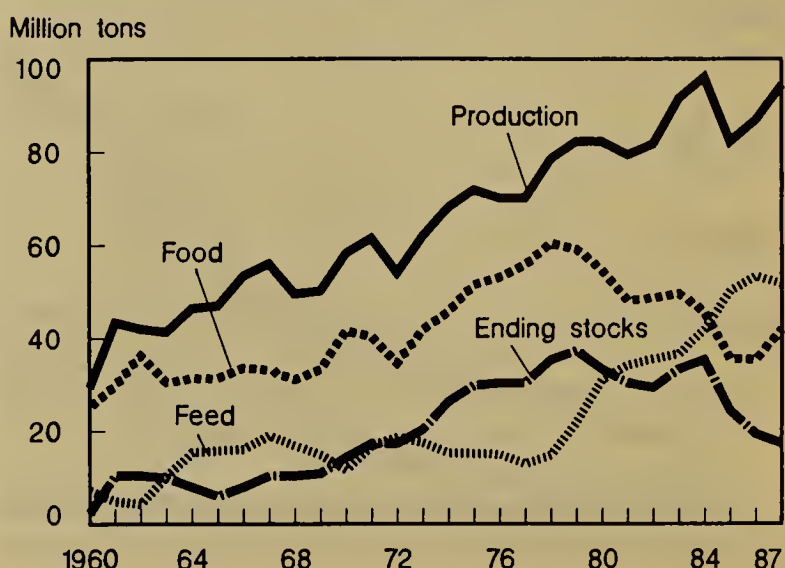
China is the world's third largest producer of coarse grains, and in 1987 coarse grains

accounted for roughly 22 percent of its total grain crop. The crop is composed of corn, sorghum, millet, barley, and oats. Balance sheets were prepared for each of the coarse grains, but for the sake of simplicity and space only total coarse grains are discussed here. Per capita production rose 82 percent from 45 kilos in 1960 to 82 in 1978. During the reform period per capita production only rose from 82 kilos in 1978 to 90 kilos in 1987. This slower growth reflects consumers' demand to upgrade their diet by eating more wheat and rice and fewer coarse grains. Demand for feed grains rose, but did not offset consumers' shift away from direct consumption of coarse grains.

China has been a net importer of coarse grains for 15 years and a net exporter for the remainder of the years from 1960 to 1987. For the whole period imports averaged 786,000 tons per year and exports averaged 852,000 tons. During the reform period (1978-87) coarse grain imports rose and then fell sharply, while exports were minimal at the start of the reform but rose rapidly after 1983.

Coarse grain stocks were drawn down to low levels during the Great Leap Forward to boost per capita consumption. Grain authorities rebuilt stocks during the 1960's and by 1970 stocks were over 25 percent of coarse grain availability. Stock levels likely peaked in the mid-1970's at well above 35 percent of total availability. They then declined rapidly after 1984 to under 20 percent because production grew at modest rates, exports grew rapidly, and domestic demand for feed grains increased rapidly.

Figure 7
Coarse Grain Supply and Use



An increasing share of coarse grains has been used for livestock feed since 1960. At the end of the Great Leap Forward (1961) only a little more than 10 percent of total coarse grain availability was being feed to livestock. Most coarse grains were being consumed as food grains. By 1978, the beginning of the reform period, feed use had doubled to 20 percent of available use. During the reform period, per capita incomes rose, consumers opted to eat more wheat, millet, and rice, and chose to eat less potatoes, corn, sorghum, barley, and oats. These unused coarse grains were allocated for feed and the ratio of feed use to availability likely climbed to over 50 percent by 1987 (7).

The coarse grain seed estimate is a composite number. Individual coarse grain seeding rates were given in the *Ag Tech Handbook* (1). Seed use for each coarse grain was calculated by multiplying the seeding rate times the area sown to that crop for the subsequent year.

Since 1978 a declining share of coarse grains has been used as food. In 1960 consumption was estimated at 39 kilos per capita. Output expanded rapidly thereafter, and per capita consumption peaked at 63 kilos in 1978. Coarse grain consumption fell sharply during the reform period (1978-87) so that by 1987 average per capita consumption fell to 40 kilos. In this study, millet was lumped in with the other coarse grains. But while studying China's grain use it was found that millet is treated more like a food grain. It is grown in north China as a dryland crop where farmers have difficulty raising wheat. Consumers in millet-growing areas regard millet much as they do wheat and hence the feed wheat to wheat availability ratio was used to determine millet feed use.

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CHINA'S GRAIN PRODUCTION TO THE YEAR 2000

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Abstract: In 1983–84 a large group of China's agricultural authorities projected production targets for many commodities to the year 2000. In 1987 and 1988 China's authorities revised their projections. USDA does not have all the revised projections, but it appears that China's leaders do not believe the 1990 goal of 450 million tons of grain will be met until 1992.

USDA analysts made their own assessment of the grain production targets. They found that even though area sown to grain will decrease from 1987 to 2000, higher yields will produce moderate expansion in grain output. Increases in income and population, plus expanding demand for livestock products and hence feed, will expand domestic demand for grain further than domestic supplies, and China will import large quantities of wheat and modest quantities of corn.

Keywords: Production targets, grain, oilseed, agricultural policy, meat production, and trade.

China's Projections for the Year 2000

Over 400 of China's foremost specialists on rural development worked several years to project a picture for the year 2000. Some of their findings and projections were published in *Zhongguo nongcun fazhan zhanlue wenti* (Problems in China's Rural Development Strategy) (3). Table 1 summarizes the projections for grain, which includes wheat, rice on a milled basis, coarse grains, soybeans, potatoes, pulses and other grains. For the 1990 forecast China's authorities provided two scenarios. The first assumes that area sown to grain will be fixed at the 1983 level of 114 million hectares. Area sown to individual grains varies, with soybean and corn area increasing while potato, wheat, and other grain area decreases. Yields are assumed to increase from 3.262 tons per hectare in 1983 to 3.907 in 1990. The second scenario assumes that area will decrease at the same rate as it did during 1980–83, to reach 112 million hectares in 1990. Sorghum, potatoes, and some other individual grains will have reduced area. This scenario assumes yields will increase slightly faster than in the first scenario and will reach 3.925 tons per hectare by 1990.

China's experts outlined three scenarios for grain production to the year 2000. In the

first scenario experts assumed area sown to grain would be unchanged at the 1983 level. Yields were assumed to increase to 4.324 tons per hectare, 27–28 kilos over 1990. The second scenario also assumes sown area unchanged at 114 million hectares, but yields were assumed to increase to 4.621 tons per hectare or by 46.5–47.5 kilos over 1990. The third scenario assumes sown area decreases by 5 million hectares to 109 million and yields increase to 4.636 tons per hectare, or an increase of 47.5–48.5 kilos over 1990. The first and second scenarios, with little change in area sown to grain, assume that output targets can be met only if strict administrative regulation prohibits farmers from shifting area from grain to cash crops, and that the multiple cropping index rises to 155. The third scenario, with decreasing area sown to grain, assumes that production targets can be achieved only if modern inputs increase and the technology of grain production improves.

In spring 1988 the Chinese Academy of Agricultural Sciences held a meeting at which experts from the China Crop Association presumably reviewed grain production forecasts made in 1983–84. The experts concluded that the 1990 production target of 450 million tons could not be reached until 1992. In the period from 1988–92 these

Table 9—China's grain area, yield, and production forecasts for 1990–2000

Items	1990						2000					
	Scenario 1			Scenario 2			Scenario 1			Scenario 2		
	Area	Yield	Pro- duc- tion	Area	Yield	Pro- duc- tion	Area	Yield	Pro- duc- tion	Area	Yield	Pro- duc- tion
	Mi. ha.	Kil/ ha	Mi. Tons	Mi. ha.	Kil/ ha	Mi. Tons	Mi. ha.	Kil/ ha	Mi. Tons	Mi. ha.	Kil/ ha	Mi. Tons
Total	114	3.91	445	112	3.93	440	114	4.32	493	114	4.62	527
Rice	33	5.63	188	33	5.63	188	33	6.00	200	33	6.38	213
Wheat	28	3.23	90	27	3.23	86	28	3.60	101	28	3.75	105
Corn	20	4.35	87	20	4.35	87	20	4.88	98	20	5.25	105
Potatoes	8	3.75	30	8	3.75	30	8	4.50	36	8	5.03	40
Millet	4	2.25	9	3	2.25	8	3	2.25	8	3	2.63	9
Sorghum	3	3.75	10	3	3.75	10	3	4.13	11	3	4.50	12
Soybeans	9	1.65	15	9	1.65	15	10	2.07	21	10	2.07	21
Other- grains	9	1.88	16	9	1.88	16	9	2.25	20	9	2.63	23

experts urged farmers to concentrate on raising yields, such as expanding the use of high yielding hybrid rice. The experts also noted that it may be possible to open up some 3 million hectares of virgin land (4 and 6).

USDA Evaluation of China's Grain Production Targets

The first step in evaluating China's projections was to create a database on China's agricultural economy (1). The second step was to study the factors affecting the growth of the general economy. Assumptions were made regarding population growth, expansion of the nonagricultural sector, rising incomes, foreign trade policy, and future economic reforms. The third step was to analyze China's agricultural policies such as price reform, factor mobility, investment, technology, transportation, and management. In the fourth step, assumptions were made about changes in cultivated land and how the crop mix could change to the year 2000. USDA evaluations follow the same sequence as printed in China's publication; total grains are treated first and then individual grains.

The Macroeconomic Environment

China's population is expected to expand at a modest rate in the next decade. From 1988 to 1990 the growth rate is assumed to be 1.3 percent a year. But birth control measures could have some impact during the next

decade, dropping the rate to 1.2 percent during 1991–2000. Each year over 10 million persons will be added to the population.

Analysts expect continued growth in China's economy over the next decade. Projections of real GNP growth range from a low of 4 percent to over 10 percent. USDA has assumed a growth rate of just under 6 percent. This, coupled with population growth of 1.2 percent per year, suggests per capita GNP will grow by about 4.5 percent annually in the initial 5-year period from 1988 to 1992.

Since 1979, rising incomes have been a major factor driving consumer demand, and have had an important impact on the mix of agricultural goods produced. USDA has assumed that personal incomes will rise by 4.3 percent a year. Given the income elasticities for most commodities, changes in income growth rates from those noted here could affect consumption and trade estimates.

While developments in domestic demand in the past 10 years have had a stronger effect on trade levels than in the past, China's foreign trade policy and foreign exchange position are also important. Industrial imports carry a higher priority than imports of agricultural commodities. There is also a policy bias towards self-sufficiency in agriculture. The large increase in agricultural imports in the late 1970's and early 1980's was part of a program of import substitution,

rather than a long-term commitment to large farm imports. These general policy elements will restrain agricultural trade in the next decade.

The large trade surplus of several years ago gave way to a serious trade deficit as the central government loosened control over imports. China incurred trade deficits of \$14.9 billion, \$12 billion, and \$3.9 billion in 1985, 1986, and 1987 respectively. These deficits were financed in part by a drawdown of reserves and by higher international debt. While reserves and credit lines remain adequate, China's financial authorities are nervous about continued deficits, and they will push hard to restrict imports and expand exports.

China's economy is in a state of transition. Several factors will be operating in the coming decade that will affect the growth of population and the general economy, per capita incomes, consumer savings and expenditures, output of agricultural products, exports, and imports. The reform of the industrial sector and greater use of the price mechanism, greater mobility of labor, and capital, changes in property rights, use of contracts, and many other elements of the economy will produce changes that are difficult to assess now. In addition, China's banking system may well be reformed. Moreover, China is negotiating to enter the GATT. Already changes are being proposed in China's foreign trade control apparatus. There is a proposal that the state-controlled foreign trade corporations be decentralized, so that provinces and major cities will have some control over branches of these corporations.

Agricultural Sector Developments

Policy will continue to expand the role of market forces, relax price controls, and carefully limit the role of the central government in agricultural decisionmaking. These steps will have an important impact on the efficiency and long-term growth rate of the agricultural sector. But the government will continue to play an important role in the countryside, particularly in influencing the production of major crops—grains, oilseeds, and cotton in particular—for which it will continue to be a major buyer. The government will continue to have an effect on decisionmaking through the use of government

purchase contracts, controls over access to bank credit, and price controls. It is important to note that some elements of China's leadership remain uncomfortable with the new market forces. If urban residents feel rising food and fiber prices have substantially decreased their living standards, or if agricultural production falters, more direct government intervention could occur.

Modernizing the agricultural marketing system will remain a main concern of agricultural policy. At least in the near term, China's major agricultural problem will center around an inadequate marketing system that cannot efficiently store, process, or distribute the large production increases registered in recent years.

For the period 1987–2000 USDA has made a number of agricultural policy assumptions. Timing will be an important element. If reforms are implemented in 1995, the projected yield increases will be smaller than if reforms are successfully implemented in 1988. It is assumed that reforms will be implemented incrementally during the 13-year period. There probably will be some quick advances followed by some years of retrenchment. The assumptions are as follows:

- o Price reforms: Price mechanisms will become increasingly important in solving economic decisions in the agricultural sector. Price reforms will be slower for the urban and industrial sectors. The price reforms will have an important impact on the dynamic efficiency and long-term growth of the agricultural sector. China's domestic economy has been insulated from world commodity markets. It is difficult to foresee how world commodity prices will affect China's domestic markets as the two markets are linked closer together.
- o Specialization: Price reforms will bring about further specialization in China's rural economy, and this will have positive effects on output.
- o Factor mobility: New land contract regulations will permit farmers to adjust land holdings to obtain more efficient-sized farm production units. Government authorities will continue to

- permit the rural labor force to have the kind of mobility they had in the mid-1980's. Government authorities will eventually allow limited capital markets to function.
- o Investment: Total net investment in the agricultural sector will be greater than in the preceding 10-year period, but the sector will continue to have less investment priority than the heavy and light industrial sectors. Government investment will increase in the next 12-year period. Money available for loans to the agricultural sector will increase and direct state investment will also increase. The government is expected to increase its investment in water control projects, which will boost crop and livestock production and also provide much-needed energy. The state will likely invest in new fertilizer plants, and infrastructure projects such as roads, railroads, canals, and telephone systems. Government support for education will also benefit the agricultural sector. Farm households invested large amounts of capital in housing during the past 10 years, but that initial surge should slow. Certainly farmers will invest in agricultural production if the reformers can provide a proper investment climate.
 - o Fertilizer: Production of chemical fertilizer will continue to expand because of investment in new plants, but the expansion will be less than the 150-percent increase over the past decade. Over the next 12 years, a better balance of fertilizers will be produced, including more phosphate and potassium. There is a plan to build a rail line to one of China's major phosphate sources.
 - o Improved seed and livestock varieties: China's good connections to the international scientific community should be maintained. Through these connections and the hard work of its own scientists, China will be able to import and produce seeds and livestock varieties that will boost output. Newly trained scientists should assist in this work. It will be especially valuable for scientists to find short-season varieties that will permit greater intensity of land use.
 - o Energy: Rural energy shortages will continue to be a serious problem. Beijing probably will be reluctant to allow price reforms to touch oil and coal prices very soon. Electrical power generation capacity will be expanded. For example, China has borrowed \$1.5 billion from foreign sources since 1984 to build power projects. World Bank loans are being used to build the Lubuge power station on the border between Yunnan and Guizhou provinces, and the first of four generating units will begin operation in 1988.
 - o Transportation and communication: The government at all levels will allocate resources to improve transportation facilities. Local governments will use corvee labor mechanisms to build feeder roads in rural areas. Provincial and national governments will build main highways and railroad lines. National and local governments will improve the telephone and telegraph systems.
 - o Plant and animal disease: In the next 12 years plant and animal scientists in China will be able to reduce losses from pests and disease. More technicians have been trained and have developed links to researchers in other countries. Improved transportation systems and concentrated feeding of livestock will bring additional problems for these specialists to solve.
 - o Rural industry: Output from rural industry will continue to expand, but at a slower rate than in the past 10 years. Food processing industries are expected to expand, and this expansion should help reduce crop and livestock product losses.
 - o Water control: The newly implemented water law will produce positive results. Beijing will continue to develop large hydroelectric and water control projects and local governments will continue to construct small hydro-plants. Local governments will likely continue to mobilize the rural labor force to maintain and construct water control facilities.
 - o Credit: The central government will make a larger quantity of loans available. Beijing has announced a plan to create a new China Rural Investment Bank. It is assumed that this new bank plus the

Agricultural Bank and rural credit cooperatives will institute reforms to capture a larger share of rural savings than in the past.

- o Technology: The use of hybrid seed varieties for corn, rice, and sorghum will be expanded. Also the use of plastic sheeting will increase. Technicians and farmers are expected to increase use of scientific methods in the feeding and care of livestock. Currently other technologies which would dramatically increase crop and livestock yields are not known to USDA analysts.
- o Labor and farm managers: The revival of the education system since 1975 probably will have positive effects on rural development in the next decade. The development of TV-based courses offers many workers a chance to improve skills. Rural extension departments also use TV, radio, and printed materials to disseminate technology. The general economic and political reforms have also created an environment in which an increasing quantity of economic data such as price, cost of production, area, yield, production, domestic and foreign trade data are being published. Authors also have been writing books and articles that are being read by farm people. Compared with the past decade, farm managers and officials in food and fiber industries should be much better informed when making economic decisions.

Cultivated Area

China's agriculture is operating on a declining area base. Crop area dropped from about 100 million hectares in 1978 to an estimated 96.18 million in 1987, an average decline of about 425,000 hectares per year. Urbanization and construction of industries and roads in rural areas will continue to reduce cultivated area. But agricultural authorities now understand the serious loss and are beginning to respond. For example, a recently completed land survey of Heilongjiang province revealed that about 1.2 million hectares of land could be reclaimed in the Songhua River basin. Authorities will allocate some resources to reclaim lands, and have proposed land use regulations that should reduce the rate of decrease. Land losses will

likely exceed gains in the next decade, and about 200,000 hectares of land will probably be lost each year out to 1992. Reclamation projects could begin to add new lands after 1992 and decrease the annual loss from 150,000 hectares in 1993 to 100,000 in 2000.

Intensity of land use as measured by the multiple cropping index (which is the ratio of sown to cultivated area) will increase. The multiple cropping index (MCI) fell during the early years in the reform period, from an estimated high of 150 in 1978 to 144 in 1982. But beginning in 1983, the estimated MCI began to rise and reached 150 in 1987. It was assumed by USDA analysts that the demand for agricultural products and the policy for self-sufficiency, along with a declining resource base, would press China's farmers to use their scarce resources more intensely. The expected MCI was therefore raised by 0.25 each year from 1988 through 2000.

The net effect of declining cultivated area and slightly increasing MCI is that sown area will decline, from slightly more than 144 million hectares in 1987 to 142.9 million in 1992 and 141.6 million in 2000.

Since 1978, cropping patterns have shifted. Area sown to grain declined from 80 percent of total sown area to an estimated 77 percent in 1987. Economic (commercial) crops such as cotton, oilseeds, hemp, sugar, and tobacco increased from 10 percent in 1978 to 14 percent in 1987. Area sown to other crops such as vegetables, fruits, and forage, and green manure crops declined from 10 percent in 1978 to 8 percent in 1987.

The percentage of total area sown to grain is expected to remain at 76.8 in 1988 and 1989, and then decline to 76.5 percent by 1992. No change is expected in the percentage sown to grain area out to 2000. The percentage of total area sown to economic crops likely will expand from 14.5 in 1987 to 15 by 1992 and then not change to 2000. Little change is expected in the percentage of total area sown to other crops.

In general yields will grow at a much slower pace during the next decade. The easiest efficiency gains have already been made from more rational resource allocation and improved producer incentives. Future growth will depend more heavily on input

growth. Fertilizer supplies over the next decade will increase at a much slower rate than the 150 percent of the last decade. Investment in agricultural production, particularly in water control facilities, is growing very little at present. The major bottlenecks facing agriculture now are the underdeveloped marketing infrastructure, and the processing, storage, and transportation sectors. These are receiving the lion's share of investment. But by the end of the decade, investment in other aspects of agriculture will have to increase if yield growth is to be maintained.

Total Grain

The USDA assessment of total grain is the sum of the assessment made for each individual grain crop and is closest to scenario 3. In scenario 3, China's experts assumed grain area would fall from 114 million hectares in 1983 to 109 million in 2000. USDA analysis shows that grain area will be around 108 million hectares. Both U.S. and China's experts projected that yields would increase 1.9 percent per year under scenario 3. They forecast a crop of 507 million tons by 2000, but given USDA's assumption of lower area, a crop of just over 500 million tons is expected.

In 1983 China estimated that the target of 450 million tons would be reached by 1990. After the spring 1988 meetings the timetable was revised to 1992, which would imply that the 1990 crop would be around 430 million tons. USDA's assessment is that the 450-million-ton mark will not be reached until 1994.

From 1988 to 2000 China is expected to become a net grain importer. China probably will import sizable quantities of wheat to meet the needs of urban consumers along the coast and up inland waterways. China is expected also to import some barley for brewing and corn for livestock feeding operations near coastal urban centers. Exports of corn from the northeast and rice from south China should continue.

USDA expects that by the year 2000 China will be feeding around 130 million tons of grain to livestock. Per capita grain consumption should rise very slowly because a large portion of the increased grain production will be allocated to feed use.

Grain stocks were low in the mid-1980's and authorities will likely strive to increase stock levels.

Wheat

With rising incomes, consumers in China have increased their consumption of wheat and wheat products. USDA believes that per capita consumption of wheat will rise steadily to the year 2000, assuming an income elasticity of 0.3 during 1988-92 and 0.25 during 1993-2000. Demand probably will be higher than these figures show, but the government likely will limit imports, which are expected to be substantial by 2000.

Reflecting this strong demand for wheat, wheat area probably will expand slightly in spite of a general decrease in grain area. Whereas China's experts forecast a decrease in wheat area of about 1 million hectares from 1983 to the year 2000, USDA believes wheat area will increase by about 1 million hectares. Also reflecting the importance of this crop, it is assumed that yield increases will average 2.9 percent in 1988-89, decrease slightly to 2.2 percent for 1990-95, and drop to 2.0 percent for 1996-2000. From 1987 to the year 2000 yields should increase at an average rate of 2.10 percent. China's experts forecast that wheat yields will reach 3.75 metric tons per hectare by the year 2000, so that the annual average rate of yield increase from 1987 to 2000 would be 1.65 percent. Because U.S. experts assumed larger sown area and higher yields, the forecast of wheat production will be much larger than China's forecast of more than 100 million tons by the year 2000.

Wheat used for feed probably will be very low at a constant 2.5 percent of total wheat available for consumption.

Rice

USDA assumed that area sown to rice would decline steadily throughout the period, and believes that by 2000 rice area will be nearly 1 million hectares below the 32 million forecast by China's experts in scenario 3. The main force behind this decline is the general decrease in cultivated area. Whereas China's experts assumed yields would increase an average of 0.7 to 1.17 percent a year from 1987 to 2000, USDA analysts assumed that yields would increase 1.75 percent per year.

Area sown to high yielding hybrid rice strains likely will increase and new varieties and increased use of chemical fertilizer probably will boost yields.

Given the relatively low level of rice stocks in the mid-1980s, USDA assumed that authorities would build stocks during the next decade at the rate of 250,000 tons a year.

A slowly increasing percentage of rice available for consumption likely will be used for feed. As a result per capita rice consumption probably will hold fairly steady and increases in availability will be used for feed.

U.S. experts assumed that China's rice imports are often tied to political and foreign policy issues, so imports are less responsive to international rice prices. A price elasticity of 0.05 for rice imports was used. On the other hand, it was assumed that China's rice exporters are more sensitive to international price changes. Therefore, analysts used an elasticity of 0.2 for rice exports.

Corn

China's forecasters held corn area at a constant 20 million hectares from 1990 to 2000. In contrast, USDA analysts assumed that despite the demand for corn for feed, food, and industrial uses, by the year 2000 area sown to corn would be 1.5 million hectares less. Increases in wheat, soybeans, cotton and other economic crops in the North China plain and in the northeast region likely will reduce the area available for corn. China's authorities assumed corn yields would increase an average 2.39 percent a year. USDA thinks that the expanded use of hybrid corn seed and wider use of fertilizer will lead to yield increases of 3 percent in the 1980's and 2.5 percent in the 1990's for an average annual increase of 2.62 percent from 1987 to 2000. USDA therefore foresees a gradual rise in corn output by the year 2000.

Corn imports probably will increase gradually to the year 2000, and demand for imported corn will be greater than actual imports. The primary reason for the limitation of corn imports will be shortages of foreign exchange and government intentions to prohibit expanded consumption of meat from animals fed on foreign-grown grain. U.S.

experts believe most of the imported corn will be shipped to major cities along China's coastal provinces for use in large urban feedlots.

An increasing portion of the corn crop available for consumption will likely be used as feed (from 57 percent in 1987 to about 64 percent in 2000). Corn used in direct human food consumption probably will not vary much from just over 30 kilograms per person.

China's corn exports are expected to gradually decline through time because of great internal demand. However, efficient corn producers in northeast China could well continue to export corn to Pacific Rim buyers.

Corn stocks are expected to rise gradually from the low levels reached in the mid-1980's until yearend stocks are about 20 percent of the total available for consumption.

Sorghum

China's experts in 1983 assumed area sown to sorghum would be a constant 3 million hectares by the year 2000. U.S. experts saw sorghum area fall by nearly half by 1987. On the basis of this readjustment, area sown to sorghum probably will steadily decrease to the year 2000. Expanded wheat and cotton area will take area away from sorghum. Where conditions permit, farmers will plant corn rather than sorghum because corn has higher yields. China's experts assumed yields would increase from 3.75 tons per hectare in 1990 to 4.125 to 4.25 tons by 2000. USDA thinks plant scientists may be able to develop higher yielding sorghum varieties that will boost yields, and assume an annual average yield increase of 0.97 percent. Because sorghum area drops so fast, however, sorghum output probably will decline by the year 2000. USDA analysts foresee no imports and limited exports of sorghum from the Northeast Region. Of total sorghum available for consumption an increasing portion likely will be used for feed (from about 66 percent to 87 percent.) Per capita consumption of sorghum as a food grain should hold fairly steady at about 1 kilogram per person.

Millet

In 1983 China's forecasters thought that millet area would decrease from 4 million

hectares to 3 million by 2000. In fact by 1987 area had fallen to 2.7 million hectares. Area sown to millet should continue to decline slightly, from 2.7 million hectares to 2.0 million in 2000. China's experts assumed millet yields would increase at an average annual rate of nearly 2.6 percent. USDA analysts assume yields will increase at a much more modest rate of 0.37 percent per year. Production should fall about 1 million tons to about 4.0 million by 2000. No major imports or exports are expected. Feed use is assumed to continue to be about 2.5 percent of total millet available for consumption. Stocks will expand slightly in this period. Per capita consumption is expected to decrease from 5 kilos to 3.

Soybeans

China's forecasters assumed that area sown to soybeans would increase from about 7.5 million hectares in 1983 to 9–10 million by 2000. USDA concurs and assumes that China will have great difficulty expanding livestock production because of the severe constraint on available land to raise grain, forage crops, and oilseeds. Given this limited area it makes sense for China's farmers to expand the area sown to soybeans. First, soybeans can be used as a vegetable substitute for animal protein, and second, soybeans can be used as an important ingredient in livestock feed. For these reasons, the area sown to soybeans will expand even when there is a general decrease in the land allocated to grain crops. China's experts assumed yields would increase to 2.07 tons per hectare, an annual increase of 2.81 percent. USDA analysts believe that raising soybean yields will prove more difficult than that, and assume a rate of 1.7 percent.

The domestic demand for soybeans should gradually rise, and exports of soybeans and soy meal are expected to decrease. U.S. experts also think that an increasing portion of beans will be crushed and used for domestic feed.

Domestic demand should slowly cut exports, until from 1994 to 2000 only about 500,000 tons are exported each year. Imports also are expected to decrease to 300,000 tons per year from 1990 to 2000.

Potatoes

China's experts assumed that area sown to potatoes would decrease from 9.4 million

hectares in 1983 to between 7 and 8 million by 2000. USDA assumes that potato area will decline only about 10,000 hectares per year to around 8.7 million by 2000. Forecasters in China assumed that potato yields would rise at an annual average of 3.66 percent. USDA assumes that farmers will have a tough time raising yields, which will only increase 0.8 percent per year.

Demand for potatoes probably will decline because many consumers consider them food for the poor. As incomes rise consumers will prefer to eat more wheat and rice. Per capita consumption is expected to fall from 11 kilos in 1987 to 8 kilos in 2000. Potatoes used for feed as a percentage of the total available for consumption will increase.

Other Grains

Other grains include barley, oats, peas, beans, pulses, and other minor grains. Area sown to these crops totaled 9.3 million hectares in 1983 and China's forecasters assumed by 2000 that area would decrease to 8–9 million hectares. USDA concurs but feels that area could fall faster than projected by the experts in Beijing, to around 7.6 million hectares. Experts in China assumed that yields would increase at an annual average rate of 3.1 percent. USDA analysts assume that yields likely will not change much in the next 12 years.

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Table 10--China's grain area, yield, and production, 1983-87 1/

Grain	1983	1984	1985	1986	1987
Million hectares					
Sown area					
Wheat	29.05	29.58	29.22	29.62	28.92
Rice	33.14	33.18	32.07	32.27	32.07
Coarse grains	30.12	29.19	26.99	27.91	28.84
Corn	18.82	18.54	17.69	19.12	20.21
Sorghum	2.71	2.45	1.94	1.88	1.88
Millet	4.09	3.80	3.32	2.98	2.69
Barley	3.85	3.77	3.45	3.36	3.50
Oats	0.66	0.64	0.59	0.57	0.56
Potatoes	9.40	8.99	8.72	8.69	8.83
Others 2/	12.33	11.95	11.99	12.45	12.55
Total 3/	114.05	112.88	108.85	110.93	110.92
Tons/hectare					
Yield 4/					
Wheat	2.80	2.97	2.94	3.04	3.03
Rice	5.10	5.37	5.27	5.34	5.46
Coarse grains	3.04	3.30	3.05	3.12	3.32
Corn	3.62	3.96	3.61	3.71	3.85
Sorghum	3.09	3.15	2.90	2.87	3.08
Millet	1.85	1.85	1.80	1.52	1.85
Barley	1.77	1.94	1.81	1.68	1.80
Oats	1.10	1.21	1.12	1.04	1.18
Potatoes	3.11	3.17	2.98	3.10	3.15
Others 2/	1.31	1.38	1.36	1.36	1.40
Total 3/	3.40	3.61	3.48	3.53	3.62
Million tons					
Production					
Wheat	81.39	87.82	85.81	90.04	87.72
Rice	168.87	178.26	168.57	172.22	173.93
Coarse grains	91.63	96.22	82.33	87.01	95.77
Corn	68.21	73.41	63.83	70.86	76.00
Sorghum	8.36	7.72	5.61	5.38	5.80
Millet	7.54	7.03	5.98	4.54	5.00
Barley	6.80	7.30	6.24	5.63	6.30
Oats	0.72	0.78	0.66	0.60	0.67
Potatoes 5/	29.25	28.48	26.04	25.34	27.82
Others 2/	16.15	16.54	16.37	16.90	17.17
Total 3/	387.28	407.31	379.11	391.51	402.41

1/ Data presented here are official figures released by the SSB or the Ministry of Agriculture, except for (1) 1987 total and individual coarse grain production, and (2) 1983-87 barley and oat, and other grain area and production. 2/ Consists of soybeans, pulses, and other miscellaneous grains. All of these items are included in China's definition of total grains. 3/ PRC definition. 4/ Calculated from area and production figures. 5/ Converted to a grain-equivalent weight using a 5:1 conversion ratio.

Sources: China Ag Yearbook, 1983, 1984, 1985, 1986, and 1987; China Stat Yearbook, 1986 and 1987; and the 1987 SSB Communique.

Table 11—Grain, soybean, oilseed, cotton, sugar and red meat
production, China, by region and province, 1987

Region and province	:	Grain	:	Soybean	:	Oilseed	:	Cotton	:	Sugar	:	Red Meat
	:		:		:		:		:		:	
	:		:		:		:		:		:	
1,000 tons												
Northeast		46,897		5,295		671		3		4,278		1,237
Heilongjiang		17,376		3,835		126		0		3,304		321
Liaoning		12,763		492		192		3		284		573
Jilin		16,758		968		353		0		690		343
North		93,693		2,902		4,791		2,537		487		3,420
Shandong		33,937		1,030		2,343		1,244		38		1,264
Hebei		19,200		459		689		629		58		953
Beijing		2,270		31		33		3		0		129
Tianjin		1,677		67		52		13		0		65
Henan		29,484		1,104		1,366		570		198		803
Shanxi		7,125		211		308		78		193		206
Northwest		29,554		752		1,720		341		3,570		1,427
Shaanxi		9,879		250		315		56		24		319
Gansu		5,294		77		294		5		580		308
Nei Monggol		6,070		367		540		0		1,678		407
Ningxia		1,390		34		44		0		317		47
Xinjiang		5,880		24		423		280		965		213
Qinghai		1,041		0		104		0		6		133
East		75,080		1,688		3,281		711		1,502		3,068
Zhejiang		15,890		130		397		65		1,088		762
Jiangsu		32,577		662		1,211		444		297		1,349
Shanghai		2,326		14		162		16		2		188
Anhui		24,287		882		1,511		186		115		769
Central		64,772		668		1,643		554		3,555		3,565
Hubei		23,207		276		755		439		417		1,146
Hunan		25,937		249		531		56		1,230		1,638
Jiangxi		15,628		143		357		59		1,908		781
South		38,977		350		948		0		33,929		2,502
Guangdong		18,482		129		587		0		18,120		1,271
Guangxi		12,102		122		186		0		11,674		711
Fujian		8,393		99		175		0		4,135		520
Southwest		55,760		529		2,225		102		8,199		4,641
Sichuan		39,213		324		1,615		102		2,415		3,360
Guizhou		6,732		121		463				196		597
Yunnan		9,348		84		135				5,588		596
Xizang		467		0		12		0		0		88
Total		404,733		12,184		15,502		4,246		55,520		19,860

Source: SSB, Monthly Statistical Bulletin, April 1988.

Table 12--China's oilseeds and cotton area, yield, and production, 1983-87

Item	1983	1984	1985	1986	1987 1/
1,000 hectares					
Sown area					
Cotton	6,077	6,920	5,140	4,306	4,910
Oilseeds, USDA 2/	20,329	21,056	22,142	21,810	22,651
Soybeans	7,567	7,286	7,716	8,295	8,394
Oilseeds, PRC 3/	8,390	8,678	11,800	11,414	11,547
Peanuts	2,201	2,421	3,318	3,253	3,058
Rapeseed	3,669	3,413	4,494	4,916	5,289
Sesameseed	789	858	1,052	1,007	1,000
Sunflowerseed	733	1,013	1,474	1,040	1,000
Other oilseeds 4/	998	973	1,462	1,198	1,200
Kg/hectare					
Yield					
Cotton	763	900	807	824	865
Oilseeds, USDA 2/	1,356	1,542	1,426	1,418	1,470
Cottonseed	1,546	1,537	1,373	1,398	1,447
Soybeans	1,290	1,331	1,362	1,400	1,452
Oilseeds, PRC 3/	1,257	1,408	1,338	1,291	1,321
Peanuts	1,795	1,989	2,008	1,808	2,018
Rapeseed	1,168	1,232	1,248	1,196	1,272
Sesameseed	442	555	657	614	550
Sunflowerseed	1,828	1,682	1,175	1,485	1,200
Other oilseeds 4/	624	730	746	679	500
1,000 tons					
Production					
Cotton 5/	4,637	6,077	4,150	3,540	4,246
Cotton (1,000 bales) 5/	21,300	27,900	19,060	16,259	19,245
Oilseeds, USDA 2/	28,642	31,064	31,567	30,941	33,295
Cottonseed	9,274	10,640	7,055	6,020	7,105
Soybeans	9,760	9,700	10,509	11,614	12,184
Oilseeds, PRC 3/	10,550	11,910	15,784	14,738	15,250
Peanuts	3,951	4,815	6,664	5,882	6,170
Rapeseed	4,287	4,205	5,607	5,881	6,730
Sesameseed	349	476	691	618	550
Sunflowerseeds	1,340	1,704	1,732	1,544	1,200
Other oilseeds 4/	623	710	1,090	813	600
Available oil 6/	3,108	3,565	4,282	4,442	4,715
Available meal 6/	7,201	8,610	8,469	8,163	8,998

1/ All 1987 figures are USDA estimates except for output of cotton, soybeans, oilseeds (PRC), peanuts, rapeseed, and sesameseed. 2/ Oilseed data published by USDA include only soybeans, cottonseed, peanuts, rapeseed, and sunflowerseed; area includes cotton. 3/ China's total oilseed data exclude soybeans and cottonseed. 4/ "Other oilseeds" are calculated as a residual and include mainly hump (an edible oil-bearing flaxseed) and castor bean; oil-bearing tree seeds are excluded. 5/ Cotton production is on a ginned-weight basis. Bales are 480 pounds. 6/ Available oil and meal are estimated for the marketing year following harvest by applying assumed crush and extraction rates to production plus net imports of soybeans, soybean oil, and soybean meal. Other edible oils from grain crops and oil-bearing tree seeds are included in available oil.

Source: China Stat Yearbook, 1983, 1984, 1985, and 1986; China Ag Yearbook, 1982, 1983, 1984, 1985, 1986 and 1987; and the 1987 SSB Communiqué.

Table 13—China's livestock yearend inventories and livestock product output, 1983-87

Item	1983	1984	1985	1986	1987 1/
Million head					
Yearend inventory					
Hogs	298.54	306.79	331.40	337.19	326.40
Large animals	103.50	108.39	113.82	118.96	126.33
Draft animals	61.25	64.03	66.46	67.05	67.55
Cattle	78.08	82.13	86.82	91.67	98.83
Dairy cows	0.95	1.34	1.63	1.85	2.05
Water buffalos	19.15	19.51	19.93	20.41	21.50
Horses	10.81	10.98	11.08	10.99	11.00
Mules	9.45	9.96	10.41	10.69	10.80
Donkeys	4.59	4.79	4.97	5.11	5.20
Camels	0.56	0.53	0.53	0.50	0.50
Sheep	98.92	95.19	94.21	99.01	105.00
Goats	68.04	63.21	61.67	67.22	73.35
Poultry	NA	1,669.63	1,978.91	1,965.60	2,050.00
Million head					
Number slaughtered					
Hogs	206.61	220.47	238.75	257.22	255.13
Cattle	3.47	3.87	4.57	5.55	6.33
Sheep & goats	49.24	50.81	50.81	52.27	56.52
Percent					
Slaughter rate					
Hogs	68.7	73.8	77.8	77.6	75.7
Cattle	4.6	4.7	5.6	6.4	6.9
Sheep & goats	27.1	30.4	32.1	33.5	34.0
1,000 tons					
Production					
Meat	14,021	15,406	17,607	19,171	19,210
Pork	13,161	14,447	16,547	17,960	17,800
Beef	315	373	467	589	720
Mutton	545	586	593	622	690
Poultry meat	NA	1,375	1,602	1,879	2,020
Cow's milk	1,845	2,186	2,499	2,899	3,190
Sheep and goat milk	374	410	395	430	460
Sheep's wool	194	183	178	185	208
Mohair	11	11	11	12	12
Cashmere	4	3	3	4	4
Eggs	3,323	4,316	5,347	5,550	6,000

1/ All 1987 data are ERS estimates except for inventory of hogs, large animals, hogs slaughtered, hog slaughter rate, production of meat, cow's milk, and sheep's wool.

Sources: China Ag Yearbooks, 1983, 1984, 1985, 1986, and 1987 and the 1987 SSB Communique.

Table 14—Consumption of major commodities in China in 1986

Item		Unit	Rural	Urban	Urban/Rural
Grain					
Rough weight	kg	259.00	137.88		0.53
Fine grain	kg	212.00	NA		NA
Vegetable	kg	134.00	148.32		1.11
Edible oil	kg	4.19	NA		NA
Vegetable oil	kg	NA	6.24		NA
Meat, red	kg	11.79	20.16		NA
Pork	kg	NA	18.96		NA
Beef and mutton	kg	NA	2.64		NA
Meat, poultry	kg	1.14	3.72		3.26
Eggs	kg	2.08	7.08		3.40
Seafood	kg	1.87	8.16		4.36
Sugar	kg	1.59	2.64		1.66
Alcoholic					
beverage	kg	4.96	9.36		1.89
Cigarettes	boxes	NA	41.40		NA
Cotton cloth	meters	1.98	2.54		1.28
Synthetic					
cloth	meters	2.53	1.79		0.70
Woolen fabric	meters	0.13	0.39		3.00
Silk and satin	meters	0.06	0.51		8.50
Shoes	pairs	0.66	0.59		0.89
Consumer durables, yearend stock per 100 households					
Bicycles		90.31	163.45		1.81
Sewing machines		46.99	73.85		1.57
Radios		54.24	68.71		1.27
Clocks:		195.80	NA		NA
Wrist watches		145.06	298.96		2.06
Television sets		17.28	92.83		5.37
Electric fans		NA	90.01		NA
Washing machines		NA	59.70		NA

NA = not available

Source: China Stat Yearbook, 1987, pp. 693, and 700.

Table 15--China's major agricultural exports, 1984-87

		Volume				Value (1,000 yuan)				
		Units	1984	1985	1986	1987	1984	1985	1986	1987
Swine, live	1,000 head		3,080	2,960	3,110	3,020	470,060	524,710	677,010	752,410
Poultry, live	1,000 head		24,000	34,510	42,450	41,150	99,300	163,250	242,410	267,290
Beef, fresh or frozen	Tons		14,634	31,652	25,704	33,587	36,970	134,810	142,860	210,170
Pork, fresh or frozen	Tons		99,597	111,060	104,670	99,964	358,270	490,200	629,950	644,780
Broiler, frozen	Tons		27,378	12,571	27,971	16,769	77,610	46,070	134,130	93,920
Rabbit meat, frozen	Tons		35,350	24,211	13,975	20,545	99,270	96,260	91,080	153,570
Eggs	1 million		1,094	1,018	1,063	1,109	103,690	106,670	125,610	159,630
Food grain	1,000 tons		3,190	9,330	9,420	7,080	1,625,940	4,050,710	4,525,440	3,677,780
Rice	1,000 tons		1,160	1,010	950	1,020	631,080	673,510	659,130	700,890
Corn	1,000 tons		890	6,340	5,640	3,920	267,490	2,223,280	2,109,170	1,202,610
Soybeans	1,000 tons		840	1,140	1,380	1,710	552,670	780,640	1,021,650	1,384,170
Fruits	Tons		174,225	214,112	223,859	243,792	147,590	239,270	314,040	377,210
Oranges	Tons		35,599	52,308	61,239	76,160	36,300	70,080	98,190	135,070
Apples	Tons		44,013	55,188	48,135	60,345	34,510	59,360	67,659	96,200
Walnuts, in shell	Tons		11,245	11,844	13,786	9,777	19,830	27,890	45,920	36,250
Walnut meat	Tons		5,564	8,212	8,212	11,294	25,560	46,370	49,500	92,210
Chestnut	Tons		33,913	30,991	38,816	35,966	108,360	130,320	242,970	242,940
Sugar	Tons		52,167	184,025	265,475	452,493	30,380	89,680	188,490	337,110
Natural honey	Tons		37,731	54,790	80,590	66,831	66,900	115,840	219,950	200,240
Tea	Tons		145,272	136,787	172,084	174,273	695,210	891,440	1,150,680	1,354,960
Canned food	Tons		402,385	389,874	445,277	536,958	856,460	1,186,830	1,544,740	2,000,050
Pork	Tons		86,961	98,589	88,664	93,757	264,800	423,620	497,030	582,430
Vegetable	Tons		242,445	233,768	287,133	329,843	450,740	606,080	816,990	1,053,500
Fruit	Tons		48,993	40,697	47,896	87,351	71,470	82,900	123,110	224,050
Beer	Tons		26,780	28,019	28,367	32,429	18,350	26,950	38,130	50,570
Flue-cured tobacco	Tons		22,956	17,777	15,387	17,019	79,520	92,230	97,060	133,310
Goatskin	1,000 pieces		20,320	17,790	11,264	721	121,520	174,370	172,340	127,820
Furskin, raw	1,000 pieces		5,680	4,460	3,473	844	117,150	149,640	79,429	173,820
Mink skin	1,000 pieces		2,370	1,980	685	270	93,990	117,590	130,300	131,590
Raw silk	Tons		8,542	10,893	9,394	9,234	479,790	755,110	827,620	867,360
Cotton	Tons		144,784	347,026	563,157	754,577	461,820	1,286,250	1,784,430	2,831,720
Cashmere	Tons		1,795	2,069	1,502	2,560	132,930	258,010	255,010	475,530
Rabbit hair	Tons		7,873	4,450	3,556	4,908	407,740	518,310	265,123	582,190
Salt	1,000 tons		1,040	1,070	1,173	808	40,410	58,020	81,550	92,350
Oilseeds, edible	Tons		336,397	409,604	508,319	528,938	470,070	584,650	840,920	1,016,980
Peanuts and shelled peanuts	Tons		143,102	163,354	262,419	267,987	283,910	322,130	530,240	683,400
Vegetable oil	Tons		130,766	161,618	165,723	55,660	232,100	331,370	303,390	115,120
Cotton yarn	Tons		167,420	154,728	228,202	242,964	850,880	874,690	1,478,390	1,993,170

Source: China's Customs Statistics, 1985, 1986, 1987, and 1988.

Table 16—China's major agricultural imports, 1984-87

	Units	Volume				Value (1,000 yuan)			
		1984	1985	1986	1987	1984	1985	1986	1987
Food grain	1,000 tons	10,410	5,970	7,320	16,170	4,025,390	2,896,420	3,666,750	6,534,910
Wheat	1,000 tons	9,870	5,380	5,310	13,200	3,761,140	2,571,710	2,800,660	5,077,100
Barley	1,000 tons	50	30	420	210	17,360	11,940	66,640	78,780
Corn (maize)	1,000 tons	50	90	330	1,540	21,440	363,500	227,350	560,390
Dried beans	1,000 tons	40	40	50	40	38,450	49,620	76,340	40,760
Soybeans	1,000 tons	0	0	190	280	10	620	215,370	227,900
Sugar	Tons	1,230,694	1,908,721	1,182,491	1,826,814	572,210	828,190	772,790	1,107,120
Coffee & coffee extracts	Tons	5,466	518	1,832	1,564	14,620	8,600	29,210	47,850
Cocoa beans	Tons	12,372	6,324	27,165	14,474	56,510	48,860	252,750	145,180
Natural rubber	Tons	215,666	163,313	211,029	214,995	585,750	385,070	573,230	1,215,890
Synthetic rubber	Tons	32,803	72,404	83,751	40,405	103,290	240,380	246,220	189,620
Log	1,000 cubic meters	2,427	9,710	5,729	5,620	1,527,960	2,406,410	2,103,830	1,576,210
Cotton	Tons	39,774	163	187	5,976	174,850	390	540	47,600
Jute & hemp	Tons	23,701	2,500	41,023	21,718	17,750	5,090	50,900	25,350
Wool	Tons	55,751	113,375	152,205	152,503	340,980	1,022,220	1,708,280	2,021,570
Animal oil & fats	Tons	48,484	66,641	74,165	111,503	57,840	100,680	72,700	151,430
Edible vegetable oil	Tons	14,361	34,777	197,980	521,428	18,290	65,510	290,350	700,730
Other vegetable oil	Tons	58,573	109,540	272,154	328,283	107,160	198,080	254,539	475,490
Oilseeds (other than soybeans)	Tons	1,670	1,101	2,597	685	2,370	2,090	3,570	1,230
Fertilizer, manufactured	Tons	9,217,259	7,609,396	5,282,933		3,759,740	4,347,890	2,523,990	5,222,130
Ammonia sulphate	Tons	96,854	50,607	26		18,170	15,130	30	12,110
Urea	Tons	4,399,000	3,822,137	2,993,056		1,694,330	2,116,960	1,239,060	2,187,610
Agricultural agent (chemicals)	Tons	59,231	16,138	7,498		542,740	295,860	138,440	205,130

Source: China's Customs Statistics, 1985, 1986, 1987 and 1988.

Table 17—U.S. agricultural exports to China, 1985/87 1/

Item	Fiscal years			Calendar years		
	1985	1986	1987	1985	1986	1987
1,000 tons						
Wheat	1,373	144	898	816	0	1,916
Corn	0	0	1,090	0	56	1,251
Tobacco	242	125	0	99	125	0
Cattle hides, whole 2/	927	428	159	743	278	208
Soybeans	0	187	250	63	124	429
Cotton	1	0	1	1	--	--
Soybean oil	0	0	0	20	0	0
1,000 dollars						
Wheat	183,127	18,777	64,743	104,861	0	139,202
Corn	0	0	81,565	0	4,241	94,926
Tobacco	1,598	737	0	709	737	0
Cattle hides, whole	37,500	16,867	7,591	29,307	11,123	10,612
Soybeans	0	37,971	50,036	12,564	25,407	85,895
Cotton	1,661	0	726	1,582	283	248
Soybean oil	7,471	0	0	46	0	0
Others	7,572	13,239	30,169	8,033	15,663	32,001
Total agricultural	238,785	87,212	234,830	157,102	57,454	362,884
Total nonagricultural	3,401,735	3,467,267	2,792,259	3,650,904	3,019,361	3,105,670
Total exports	3,640,520	3,554,479	3,027,089	3,808,006	3,076,815	3,468,554

-- = Negligible.

1/ U.S. domestic exports, f.a.s.-value basis. Exports include transshipments of agricultural products through Canada. 2/ Numbers in thousands.

Sources: U.S. Bureau of the Census, "U.S. Agricultural Exports," country by commodity, monthly printouts; U.S. Department of Agriculture, Economic Research Service, U.S. Foreign Agricultural Trade Statistical Report, various issues.

Table 18--Major U.S. agricultural imports from China, by calendar year, 1985-87 1/

Commodity	1983	1984	1985	1986	1987
1,000 dollars					
Meats and products, excluding poultry	1,040	1,027	687	24	1,300
Other meats, fresh or frozen	971	1,020	650	23	1,280
Poultry and products	8,368	12,358	15,746	23,265	35,513
Eggs	591	1,003	813	1,143	1,206
Feathers and down, crude	7,776	11,355	14,933	22,122	34,303
Hides and skins	1,119	927	1,080	909	923
Furskins	892	875	690	228	780
Wool, unmanufactured, apparel grades	4,182	4,020	3,786	2,101	3,615
Sausage casings	2,438	2,076	1,191	1,971	2,391
Silk, raw	5,140	4,518	3,433	3,060	4,259
All other animal products	14,655	16,418	16,292	19,528	23,658
Grains and feeds	3,889	4,461	4,743	4,037	4,987
Fruits and preparations	6,519	5,466	4,069	4,358	7,415
Fruits, prepared or preserved	6,517	5,461	4,060	4,355	7,410
Nuts and preparations	5,846	8,207	7,783	7,169	7,352
Vegetables and preparations	18,796	57,824	56,524	53,081	68,800
Vegetables, prepared or preserved	18,385	57,197	56,152	52,125	67,043
Mushrooms, canned	4,559	37,947	37,553	31,037	41,446
Waterchestnuts	6,303	10,795	12,197	13,369	16,393
Sugar and related products	8,078	5,278	7,070	11,622	6,298
Spices	6,103	7,906	8,905	7,843	7,902
Beverages	22,483	30,912	42,014	39,704	35,749
Coffee and products	1,444	0	433	452	404
Cocoa and products	7,935	8,701	15,243	10,294	6,286
Tea	9,938	18,279	18,269	16,469	14,215
Malt beverages	2,413	2,876	3,508	5,814	6,895
Oilseeds and products	7,902	4,661	2,657	3,687	4,172
Oilseeds and oilnuts	6,361	1,912	1,344	1,193	1,004
Oils and waxes, vegetable	1,541	2,749	1,311	2,494	3,168
Seeds, field and garden	778	1,288	1,307	1,579	2,974
Essential oils	13,944	12,943	13,309	13,376	13,754
Drugs, crude natural	8,282	6,282	6,377	4,637	7,343
All other vegetable products	3,422	4,403	3,467	3,874	5,563
Total agricultural commodities	142,985	190,960	197,192	204,278	237,463
Total nonagricultural commodities	2,101,115	2,873,846	3,666,208	4,467,222	5,957,837
Total imports	2,244,100	3,064,806	3,863,400	4,671,500	6,195,300

1/ Imports for consumption, customs-value basis.

Sources: U.S. Department of Commerce, Bureau of the Census, "U.S. Agricultural Imports," country by commodity, annual printouts; U.S. Department of Agriculture, Economic Research Service, U.S. Foreign Agricultural Trade Statistical Report, various issues.

Table 19--China's trade in grain, by country, 1985-87 1/

Item	Calendar year			July June year		
	1985	1986	1987 2/	1985/86 3/	1986/87 3/	1987/88 3/
1,000 tons						
IMPORTS:						
Total grain	5,713	6,895	15,313	7,300	4/10,200	4/14,300
:of which						
Argentina	875	393	962	596	916	599
Australia	1,261	3,023	4,612	2,785	3,143	2,269
Canada	2,370	2,688	6,036	2,823	2,747	5,920
EC	324	115	462	252	452	25
Thailand 5/	67	497	80	280	452	0
United States 6/	816	91	3,164	542	7/1,174	3,777
Wheat	5,599	5,745	13,444	6,600	7,500	4/13,500
:of which						
Argentina	875	363	819	566	813	299
Australia	1,214	2,923	4,414	2,704	2,984	2,169
Canada	2,370	2,310	5,836	2,587	2,604	5,820
EC	324	115	462	252	617	25
United States 6/	816	34	1,916	542	7/91	3,500
Coarse grain	137	1,062	1,869	700	2,700	800
:of which						
Argentina	5	30	143	30	103	300
Australia	65	100	198	81	159	100
Canada	0	378	200	236	143	100
EC	0	0	0	0	0	0
Thailand	67	497	80	350	318	0
United States 6/	0	57	1,248	0	7/1,027	277
EXPORTS						
Rice 9/	1000	950	1,020	NA	NA	NA
Coarse grain	6,340	5,640	3,800	7,100	4,300	2,400
Hong Kong	190	60	50	200	50	NA
Japan	2,578	2,689	1,838	2,766	2,200	723
South Korea	1,062	945	197	827	600	274
Soviet Union 10/	1,200	1,200	1,200	1,200	1,200	1,200
Others 10/	310	746	515	2,070	250	203

NA = Not available.

1/ Quantity data for the the major trading partners comes from official partner-country trade statistics, data is not complete, and country numbers may not sum to totals. 2/ Preliminary. 3/ USDA forecasts as of June 1988. The total grain forecast is a mixed year total--wheat July/June and coarse grain October/September. 4/ Current USDA forecast. Country data is for shipments through April and May 1987. 5/ Includes rice imports. 6/ Direct exports plus transshipments through Canada. 7/ The U.S. number represents outstanding sales and shipments as of June 1988. 8/ October/September. 9/ Milled basis. China exports rice primarily to Asian and Eastern European nations and Cuba. 10/ Estimated.

Sources: Official partner-country trade statistics.

Table 20—China's trade in other agricultural commodities, by country, 1985-87

Item	Calendar year			Marketing year 1/		
	1985	1986	1987	1985/86	1986/87	1987/88
1,000 tons						
IMPORTS:						
Cotton				22	11	20
Soybeans	51	290	273	290	250	450
Soybean oil	21	171	417	126	447	375
Oilseeds 2/	1.1	2.6	NA			
Oils 2/	34.8	198.0	NA			
Sugar 4/	2,180	1,182	1,831			
Australia	452	394	403			
Cuba	680	307	411			
Philippines	80	40	15			
Thailand	911	307	727			
United States	—	—	177			
Others	57	134	97			
EXPORTS:						
Cotton				435.4	690.0	480
Hong Kong				108.8	151.3	NA
Indonesia				16.3	41.4	
Japan				98.0	133.2	
Soviet Union & E. Europe				65.3	113.0	
Thailand				27.2	32.0	
Others				119.7	219.1	
Soybeans	1,151.0	1,368.2	1,710.1	1,250	1,750	1,300
Hong Kong	37.9	9.1	16.1	10	10	NA
Indonesia	201.3	260.4	273.7	294	250	
Japan	345.5	343.4	296.8	280	250	
Malaysia	79.6	150.3	126.4	50	50	
Singapore	4.4	19.9	31.7	5	10	
Soviet Union	388.4	448.5	816.3	400	400	
Others	93.6	136.6	149.1	211	780	
Soymeal	719.6	1,108.4	NA	1,113	1,431	1,600
Hong Kong 5/	81.1	50.0		75	73	NA
Indonesia	135.7	38.0		79	180	
Japan	41.0	80.3		92	98	
Malaysia	119.0	134.0		137	136	
Philippines	0	134.0		134	206	
Singapore	95.9	104.4		119	93	
South Korea	113.9	72.2		83	123	
Thailand	105.1	162.5		162	177	
Western Europe	58.7	328.0		169	346	
Oilseeds 2/	409.6	509.8	NA			
Oils 2/	161.6	165.7	NA			
Sugar 4/	184.0	265.4	452.4			

NA = Not available.

— = Negligible.

1/ Marketing years = cotton, August/July; soybeans, September/August; and soybean oil and meal, October/September. 2/ Excludes soybeans and soybean oil. 3/ Includes soymeal. 4/ Raw-value basis. 5/ Includes all oilmeals exported to Hong Kong.

Sources: Official partner-country trade statistics and various issues of China's Customs Statistics.

CONVERSION EQUIVALENTS AND DEFINITIONS

Chinese	Metric		English
1 mu	0.0667 hectare		0.1647 acre
15 mu	1.0 hectare		2.4711 acre
1 jin (catty)	0.5 kilogram =	.0005 ton	1.1023 pounds
1 dan (100 jin)	50.0 kilograms =	.05 ton	110.23 pounds
1 dun (ton)	1,000.0 kilograms =	1.00 ton	2,204.6 pounds

1 jin/mu 7.5 kilograms/hectare 6.93 pounds/acre

Crops	Pounds/bushel	1.0 bushel	1.0 ton
Wheat, potatoes, soybeans	60	0.02722 ton	36.743 bushels
Rye, corn, and sorghum	56	0.02540 ton	39.368 bushels
Barley	48	0.02177 ton	45.929 bushels
Oats	32	0.01452 ton	68.894 bushels
Cotton (480-lb bale)	NA	NA	4.593 bales
Cotton (500-lb running bale)	NA	NA	4.409 bales

Exchange rate

In 1987 1 dollar averaged 3.7221 yuan.

Total grain--China

Total grain defined by China's State Statistical Bureau (SSB) includes wheat, paddy rice, corn, sorghum, millet, barley, oats, potatoes, soybeans, and other grains such as pulses, beans, peas, proso-millet and other grains. Total output in 1987 was 402 million tons.

Total grain--USDA Supply and Use Tables

Total grain as used by USDA analysts to construct supply and use tables consists of all the grains defined by the SSB but includes rice on a milled basis. Total output in 1987 was 350 million tons.

Total grain--USDA Estimates and Forecasts

USDA makes estimates and forecasts for the following grains: wheat, milled rice, and coarse grains which include corn, sorghum, millet, barley and oats. Total output in 1987 was 305 million tons.

ABBREVIATIONS FOR MAJOR SOURCES

Ag Econ Handbook	Agricultural Technical Economic Handbook Editing Committee, Nongye Jishu Jingji Shouce (Agricultural Technical Economic Handbook), Beijing, Nongye Chubanshe, May 1983.
China Ag Yearbook	He Kang, Editor and Chairman of Agricultural Yearbook Committee, Various issues published in 1980, 1981, 1982, 1983, 1984, 1985, and 1986. Zhongguo Nongye Nianjian (China Agricultural Yearbook), Beijing, Nongye Chubanshe.
China Stat Yearbook	State Statistical Bureau, Editor, Various issues published in 1981, 1983, 1984, 1985, and 1986. Zhongguo Tongji Nianjian, (China Statistical Yearbook), Beijing, Zhongguo Tongji Chubanshe.
FB or FBIS	Foreign Broadcast Information Service, Daily Report: China, National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia.
RmRb	Remnin Ribao (People's Daily), Beijing, China.
SSB Communique	Communiques of the State Statistical Bureau of the People's Republic of China on fulfillment of China's National Economic Plans, Beijing, China's Financial-Economic Press, 1980, 1981, 1982, 1983, 1984, 1985, and 1986. These communiques are also published in RmRb and FBIS.
Trip Report, 1986	F.W. Crook, "Notes on China's Grain Supply and Use: A Trip Report, July 15 to August 14, 1986," PRC Section, Asia Branch, International Economics Division, Economic Research Service, September 1986.
USDA/FAS/Beijing	Various annual reports such as grain and feed, rice, and oilseed reports from the Agricultural Counselor and his staff, USDA, Foreign Agricultural Service, Beijing, 1987 and 1988.

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